TOOLING & PRODUCTION Magazine

DECEMBER 1959

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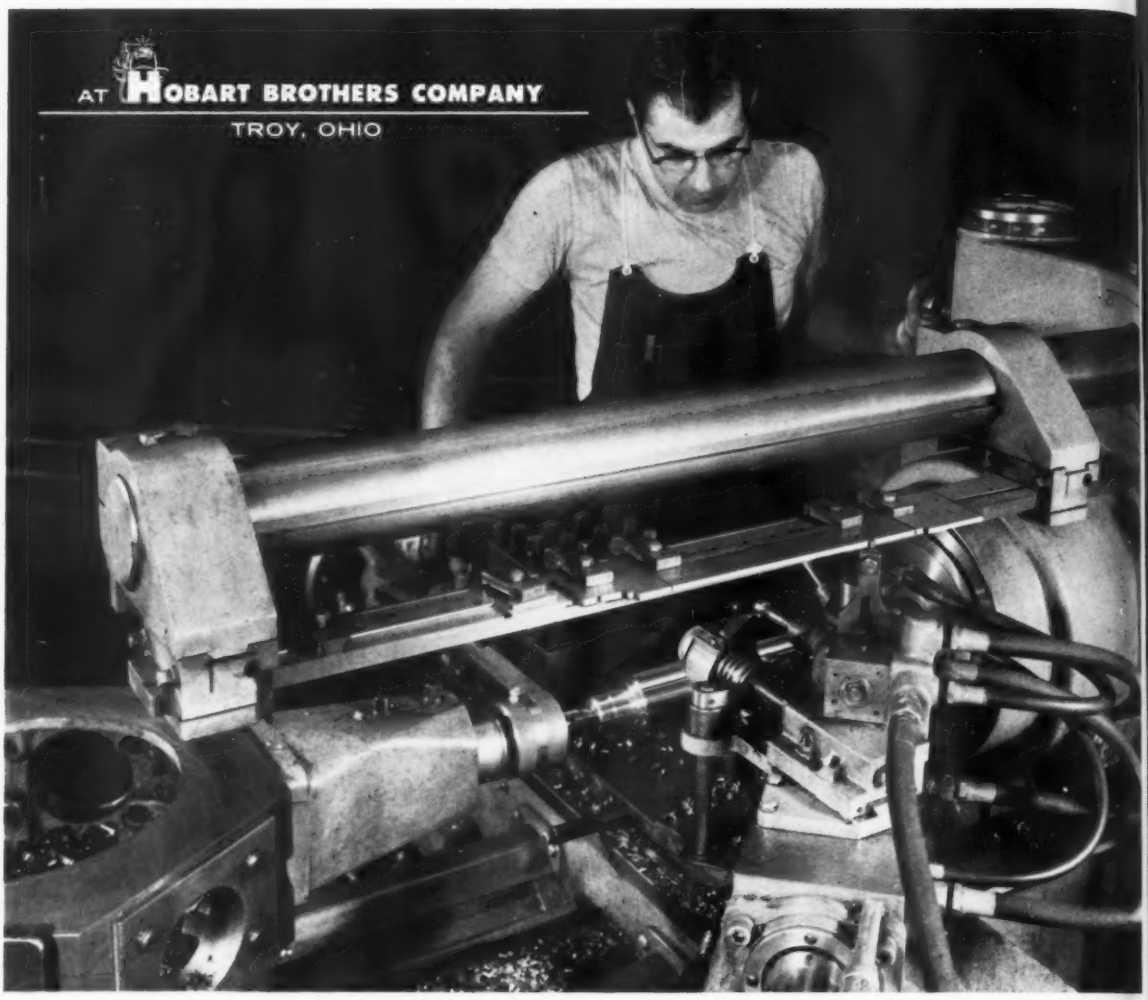

Warner & Swasey 2-A with contouring cross slide

Slashes setup time—from 2 hours to 20 minutes • Combines auxiliary operations into one setup • Produces shafts at 1948 cost levels

Hobart Brothers Co. faced a serious production bottleneck. Long setup time on their older turret lathes and excessive part handling time was crippling the small lot production of motor-generator shafts. Because their production scheduling for 77 different models of arc welders, 20 models of ground-power units, plus numerous specials, is tied directly to sales, lot sizes frequently had to remain small—usually from 1 to 20 pieces.

Hobart launched a three-pronged attack to solve the problem by:

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2. A creative tooling approach to reduce setup time.
3. A thorough time and motion study to insure efficient utilization of daily production time.

As a result, Hobart Brothers today are producing shafts at 1948 production costs!

Contributing to the success of this efficiency study and modernization program was their new contour cross slide equipped Warner & Swasey 2-A which also permitted:

- **Combining of center drilling, facing and threading operations into a single, efficient turret lathe setup reducing part handling time.**
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- **Holding closer tolerances which reduced grinding time and extended grinding wheel life.**

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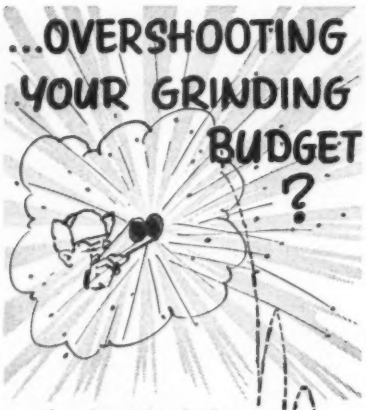

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CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

DECEMBER 1959
VOL. XXV No. 9
GEORGE J. HUEBNER, Founder
1885 - 1956

personally speaking ...

Dear T & P Reader:

One brief portion of J. O. Ellison's report on his visit to the Paris Machine Tool Show, and to some of the larger machine tool plants in Holland, Germany, and England, pinpoints the problems faced by our machine tool industry.

Mr. Ellison is president of The American Machine Tool Distributors' Association. He told the association's 35th annual meeting:

"Following the show, I visited some of the larger machine tool plants in Holland, Germany and England. It was here that I found what I thought were the most significant things about their industry which I had not known before. For example, it was news to me that many of the important plants in these countries are running at or near capacity. Not only is their business coming from Free Europe, but some of the really important orders are now, and have for several years, been coming from Russia and Red China. Naturally, with fairly prosperous business for special machinery from the European automobile makers and appliance makers, which is at a particularly high rate at the moment, added to the business from Russia and Red China, you have the makings of real prosperity in the European machine tool industry at the moment. One of the better known builders in Germany, who has often been described as one of the big threats to the American market on general purpose machine tools, is, at this moment, so busy making special machinery that he could not be a factor in America if he shipped every general purpose machine tool he is now building to this country. You cannot help but wonder, however, what would happen if that plant and others like it were to suddenly get caught up on their Iron Curtain business and really unleash their total capacity in pursuit of our market for general purpose machine tools."

I see this as a challenge which we, each in his own way, must face.

Cordially yours,

Ray Huebner

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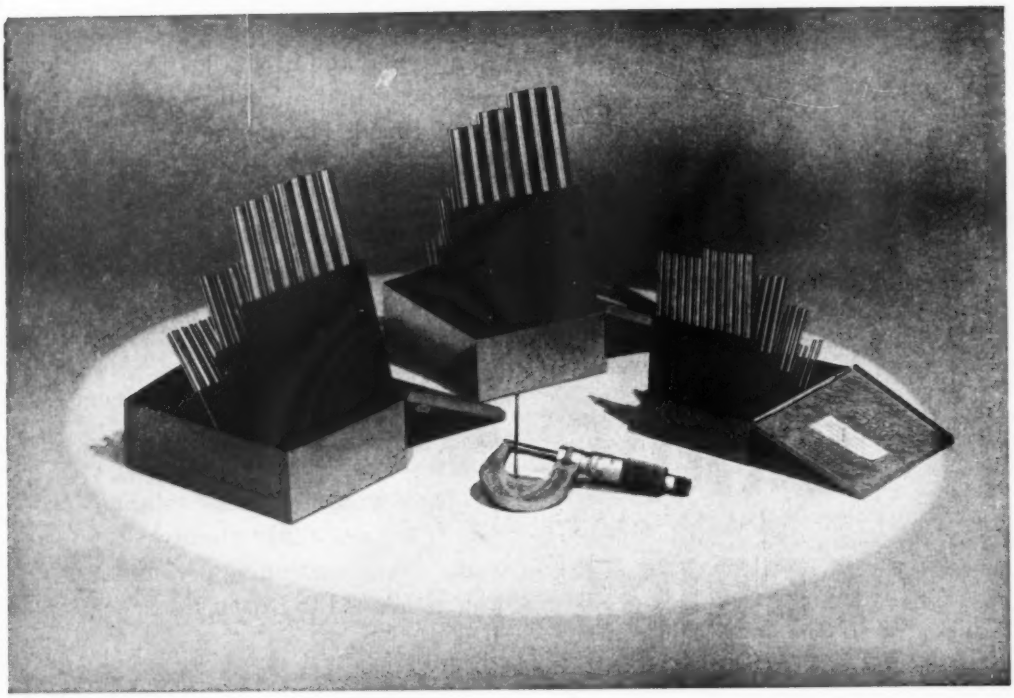

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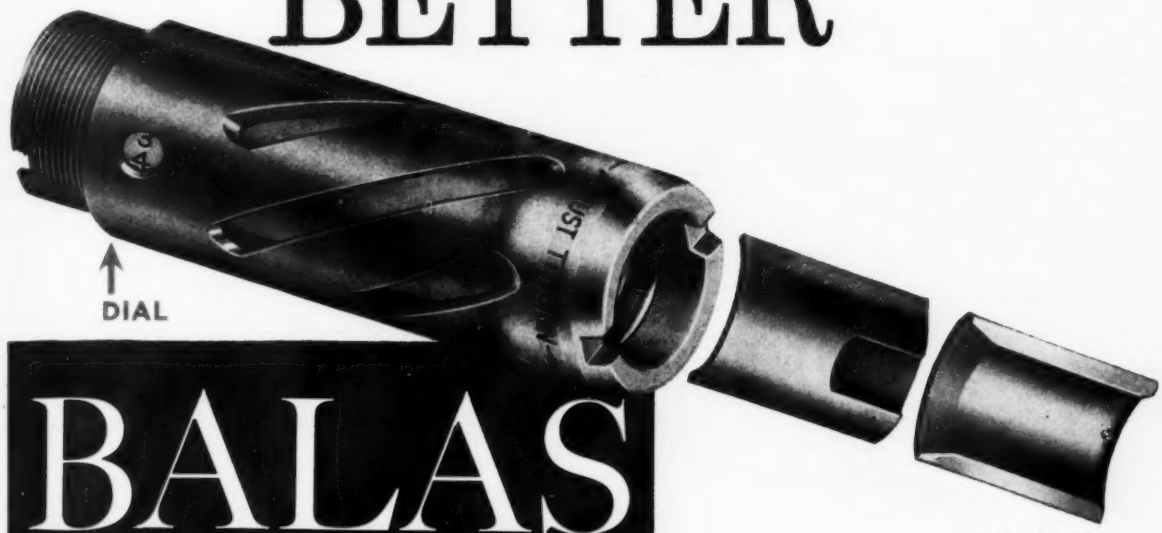

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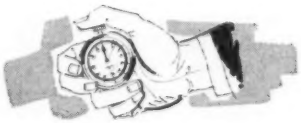

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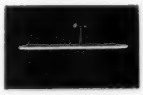

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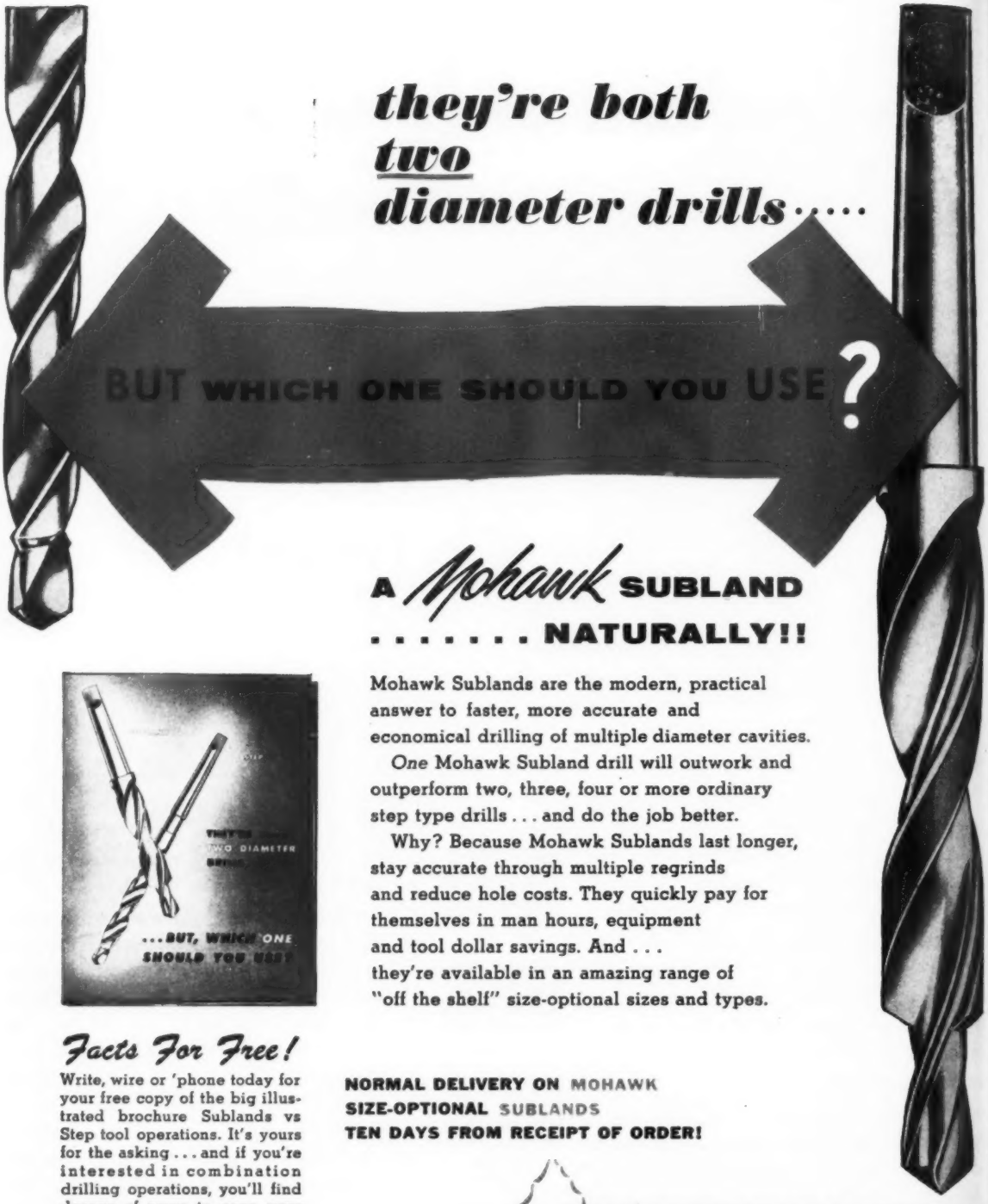

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CIRCLE INFORM-A-GRAM KEY NO. 10

Talk of the Month

Improving Inventory Control Through Training

by F. E. Willson

ONE OF THE MOST important factors in achieving successful Inventory Control and Management, is well trained personnel. It is important not only that the staff responsible for this function be given the opportunity for adequate training, but all major divisions of the company must have at least a speaking acquaintance with the problems and objectives that are involved.

Our Inventory Control Division is one of the four divisions making up the basic Production and Engineering Division. The others are Production, Engineering, and Industrial Engineering.

The Inventory Control Division carries out its responsibilities with these four sub-divisions — Planning and Distribution, Materials Control, Foreign Stock and Shipping, and Traffic. The following functions are carried out by the four units:

- Sales Forecasting.
- Production Forecasting.
- Production Planning.
- Production Control.
- Planning, Acquiring, Storage and Supplying of Materials.
- Traffic.
- Storage, Distribution and Control of Field Stocks.

This featured talk is excerpted from an address by the author at the recent Second Annual Technical Conference of the American Production & Inventory Control Society. Mr. Willson is Assistant Director of the Commercial Development Div'n at Parke, Davis & Co., Detroit.

In reviewing our inventory position in 1954, it was found desirable to accelerate progress in Inventory Control and Management. There was the feeling that some of the newer methods and tools that had been and were being developed, might result in better Inventory Control and Management. Our objectives for the program were stated as follows:

- Reduce inventory and costs associated with inventory.
- Reduce manufacturing costs.
- Accomplish a more effective use of space.
- Equip personnel to carry out and extend the program.

The program was launched early in 1955 with our President calling a meeting of approximately 50 persons which included major executives, key supervision, and interested technical personnel.

... Continued on page 12

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CIRCLE INFORM-A-GRAM KEY NO. 11

. . . Months' Talk from page 11

It was stressed that our first approach would be given to training our personnel in applying to our problems, recently developed methods of Inventory and Production Control including Linear Programming. This would include regular classroom instruction in the actual phases of the newer methods and tools available, followed by on-the-job coaching and help in installing these procedures.

This meeting was held to acquaint them with the over-all aspects of the project and clear the way for the gathering of information from various divisions. It was explained that these newer methods and techniques were interesting and personnel from related functions who had direct or indirect interest in Inventory Control and Management, would be welcome in the Technical Meetings that were planned.

The Technical Meetings were started two weeks after the project was launched and the first was opened by the Director of Production and the Director of Inventory Control, speaking briefly on the reasons for the project, with these objectives in mind:

1. To show what data was needed and why it was needed in connection with new procedures and methods. Details would be given on how different tables, formulas, and graphs were developed.

2. These two groups would be the nucleus to equip company personnel with the know-how and the basic principles so the installation could be continued, expanded and revised if necessary.

3. The reason for participants from different departments was particularly stressed, pointing out that it was to be a cooperative venture.

We strongly recommend this approach in any such endeavor since we are sure it went a long way in having the project move smoothly, not only in its launching but in keeping it before the group in later months.

Using class participation techniques, they were trained or retrained, in all aspects of Inventory Control. New sights were given them on their problems, a common vocabulary was acquired; here was a medium of discussion, here they could discuss with other personnel what they had to consider in their departments and determine how each could help the other.

From those attending these Technical Meetings, a group was chosen to attend five sessions on Linear Programming. When these first classes were finished, our personnel agreed that they had tools for use in Inventory Control and Production problems that had not been available

. . . Continued on page 14

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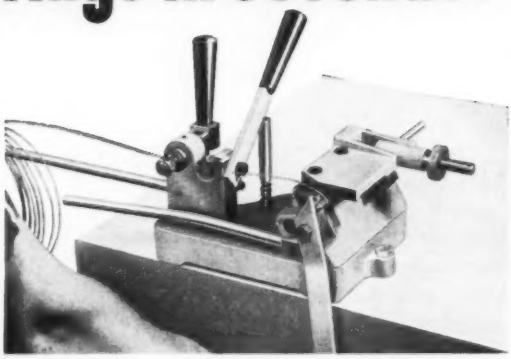

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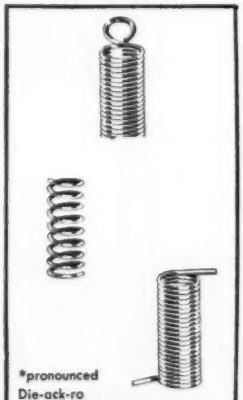

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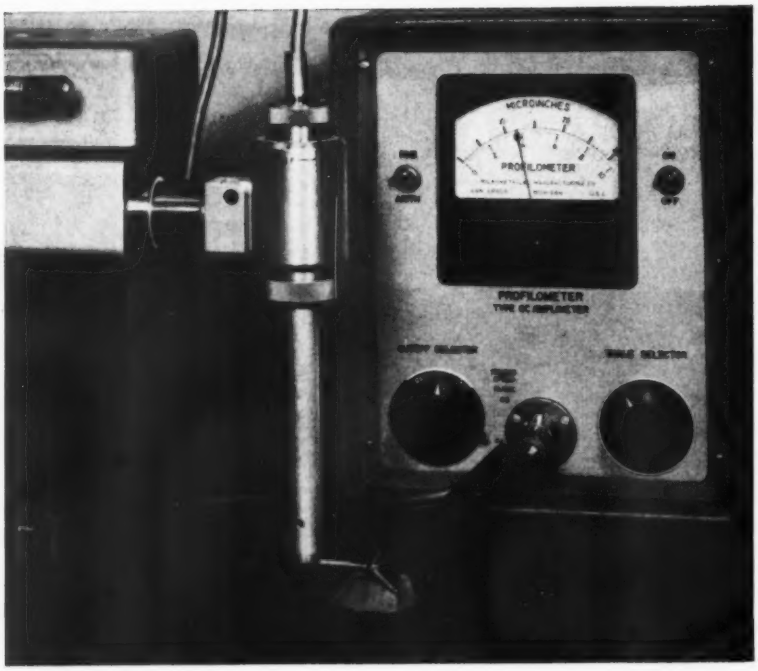

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CIRCLE INFORM-A-GRAM KEY NO. 14

. . . Months' Talk from page 12

to them prior to the training course.

Appreciation Meetings

About a month after starting the Technical Meetings, we opened a second series, called "Appreciation Meetings," intended to acquaint higher supervision with some of the newer concepts and methods of Inventory Control and Management.

The Vice President and Director of Production and Engineering opened the first meeting pointing out that the purpose was to give them some conception of the vocabulary so when questions were asked of them by people in the technical group, they would have some idea of what was being discussed and there would be less likelihood of misunderstandings.

Then too, they were to learn what data was needed and how it was being used, and to get some idea what we would be doing in the future in connection with Inventory Control and Management.

From the Technical Meetings, the Linear Programming Meetings and the Appreciation Meetings, we had over 60 people thoroughly interested and informed on Inventory Control and Inventory Management problems. In a relatively short time our program had been launched and it was only a matter of working out our problems using these new tools.

The support obtained from top Management played a very important part in successfully initiating the program. Top Management was kept informed not only in the Appreciation Meetings, but also by means of verbal progress reports at rather regular intervals.

A decision made in planning the program was to install Inventory Management and Control procedures by groups of products rather than across the board. This was to be accomp-

. . . Continued on page 17

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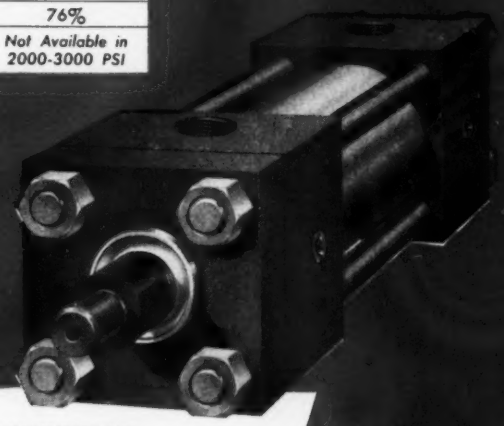
5	800	1200	37%
6	800	1200	43%
8	500	800	50%
10	500	800	71%
12	500	800	76%
14	500	800	*Not Available in 2000-3000 PSI*

with IDENTICAL seals, design, and safety factors as the famous Miller "Power-Packed" Model "H" Line for 3000-5000 psi service.



SEAL FAILURE MEANS CYLINDER FAILURE!

1. *No seal made of synthetic rubber is compatible with even 50% of available, commercial, petroleum base hydraulic fluids.*

MILLER Uses All Teflon* Seals to Eliminate External Oil Leakage **because** Teflon is impervious to all known hydraulic fluids, even fire-resistant types.

TEFLON SHEF SEAL At Tubing Ends

No blind assembly. Is
Shear-proof
Heat-proof
Extrusion-proof
Fluid-proof

TEFLON Seals On Piston Rod And Bushing

Teflon rod flange seal requires no adjustment. Teflon bushing seal is shearproof. Teflon wiper keeps dirt out.

TEFLON Seals On Ball Check And Adjusting Screw

Non-protruding, self-locking, cushion adjusting screw interchangeable with ball check for easy access.

NOW! You can save MORE with quality Miller "Job-Rated" Cylinders than with cut-price, lesser quality hydraulic cylinders. And the "Job-Rated" Cylinders are also available under the same immediate shipment program as the Power-Packed Line (2 hours if necessary—3 days normal).

* U.S. Pat. Reg. Trademark for tetrafluoroethylene resin for use between temperatures from −100° F. to 500° F. and all hydraulic fluids.

MILLER Uses Resin-Impregnated Leather Piston Cup Seals **because** they are compatible with petroleum base fluids and some fire-resistant types. Teflon cups available at small extra cost.

2. *Nicked or scored piston rods cause seal failure*

MILLER Uses Case-Hardened Chrome-Plated Piston Rods because they prevent nicks, scoring and rust.

OTHER MILLER QUALITY FEATURES

- Rust-Resistant Surfaces
- Interchangeable, Space-Saving Square, 4-Tie-Rod Design
- Precision Honed Barrels

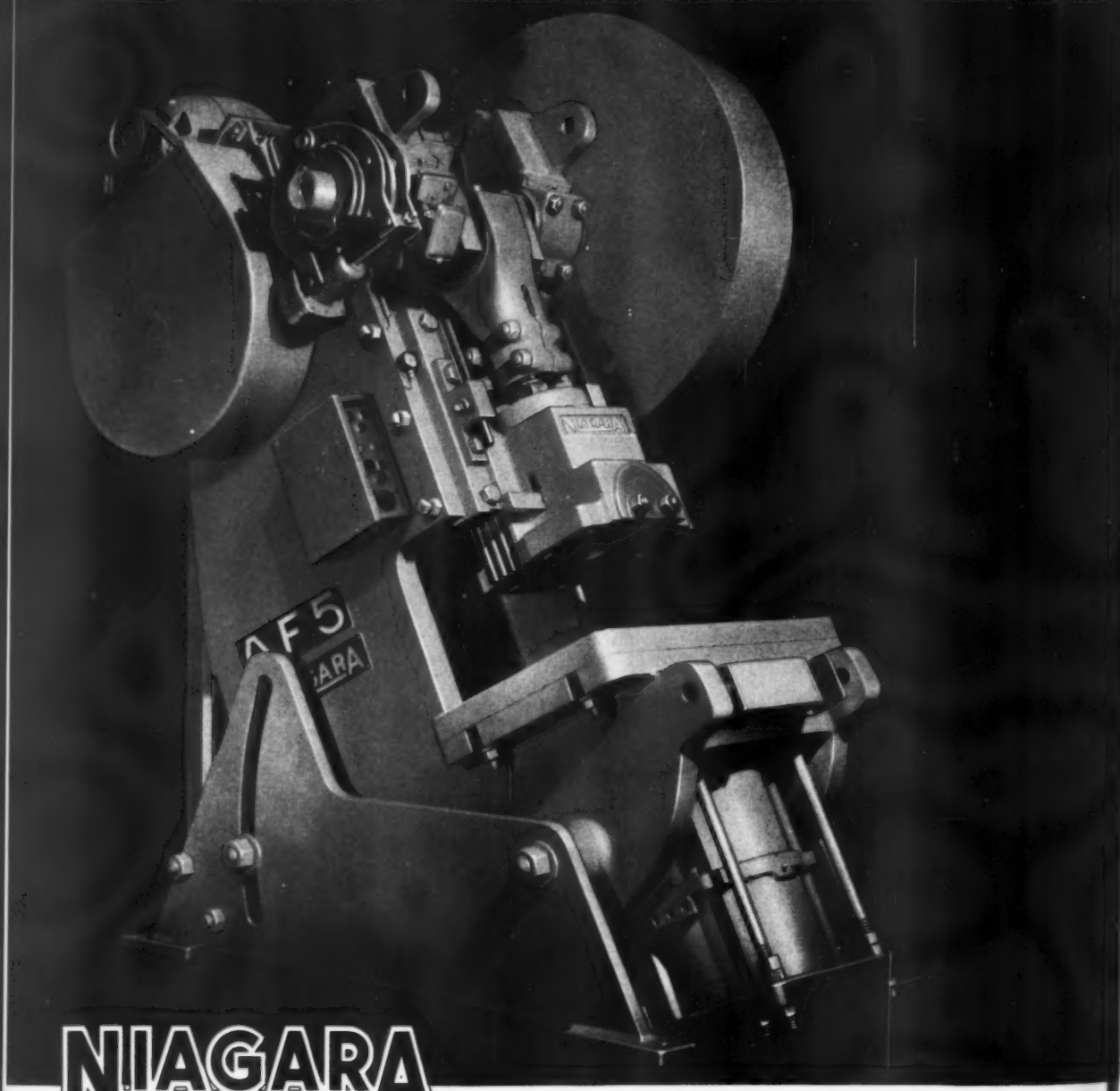
CIRCLE INFORM-A-GRAM KEY NO. 15

MILLER FLUID POWER

7NO28 York Road, Bensenville, Illinois

AIR AND HYDRAULIC CYLINDERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS • BOOSTERS

A GREAT NEW LINE* JOINS NIAGARA'S BIG OBI FAMILY



NIAGARA

Meet the new Series AF. Look it over . . . typical Niagara engineering from crown to base . . . every detail a benefit to you.

- Rugged, rigid frame for greater accuracy, longer die life.
- Unusually long, rigid slide of unique design prevents deflection of ways, solidly supports dies and extends their life.
- Exclusive multiple "V" gibbing for more guiding surface and greater resistance to off-center loads.
- Cool-running, long-wearing, pneumatic friction clutch and brake operate directly on the crankshaft . . . fewer parts to start and stop . . . faster engagement.
- Modern, rigidly supported gearing runs in sealed oil bath for long life.
- Simplified control for safer, time-conserving press operation.
- Patented one-man inclining mechanism.
- Full complement of accessories to meet your specific needs.

Look at the range: 14 sizes, geared and non-geared, shaft diameters 1¼" to 7½", capacities 5½ to 250 tons.
Niagara Machine and Tool Works, Buffalo 11, N. Y.

Now get the whole story . . .
Send for New Bulletin 55.

DISTRICT OFFICES: Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia / Distributors in principal U.S. Cities and major foreign countries.

CIRCLE INFORM-A-GRAM KEY NO. 16

... Months' Talk from page 14

lished department by department, completing the installation in one department before moving on to the next.

Continuing Training

In 1956, a second series of Technical Meetings was given, with new participants from the Production, Purchasing, Controllers, Sales and Inventory Control Divisions.

In 1957, two classes were instructed; one by the Superintendent of Planning and Distribution, the other by the Senior Industrial Engineer working on the project.

In 1958, two technical classes were given, both instructed by a Staff Specialist on Inventory Management. In addition, an International Seminar was held. This was of one week's duration and intensive instruction was given the participants on Inventory Control and Management.

In 1959, a technical session has been held and it is planned to give a specialized course in Linear Programming before the year ends.

Consideration has been given to a further training program at the clerk level. This would cover some of the simpler aspects of Inventory Control particularly the area concerned with the procurement of materials and supplies. If this plan is placed in operation, then training at all levels of employees will have been covered. end

---

BUY

US SAVINGS BONDS

TODAY!

Deaths

J. Chester Bath, 67, vice president, treasurer, and a director of John Bath & Co., Inc., died Oct. 19 after a short illness.

One of many assembly lines of skilled operators employing AO CYCLOPTIC Stereoscopic Microscopes to assemble advanced germanium computer transistors at Texas Instruments vast Semiconductor —Components division in Dallas, Texas.

Here's how Texas Instruments mass produces precision transistors

with AO's CYCLOPTIC Microscope

Precision assembly of minute components for transistor production offers no problem to the skilled workers at Texas Instruments. Using the AO CYCLOPTIC Stereoscopic Microscope, material that is practically invisible to the eye assumes accurately magnified proportions...the entire assembly operation is observed in crisp, erect, three-dimensional detail.

Bright, shadowless lighting is beamed deep inside the small unit apertures with AO's exclusive Vertical Illuminator attachment. The instrument's remarkable long working distance assures the operator of complete freedom of movement and affords ample room to accommodate larger objects and assembly tools.

With the instrument body inclined at a 30° angle, the operator can work in a natural, more comfortable position.

When manufacturing small precision assemblies... many progressive companies such as TI, depend upon the AO CYCLOPTIC to render the unit in visual "working size" dimensions.

If you have a particular production situation that 3-D magnification would help, why not discuss it with a capable AO Sales Representative. He can recommend the AO CYCLOPTIC Stereoscopic Microscope that will certainly solve your individual problem. There is no obligation, of course.

American Optical Company

INSTRUMENT DIVISION BUFFALO 15, NEW YORK

Dept. X-179

☐ Please have AO Sales Representative demonstrate the AO CYCLOPTIC Microscope.

☐ Please send AO CYCLOPTIC Brochure SB56.

NAME_____

ADDRESS_____

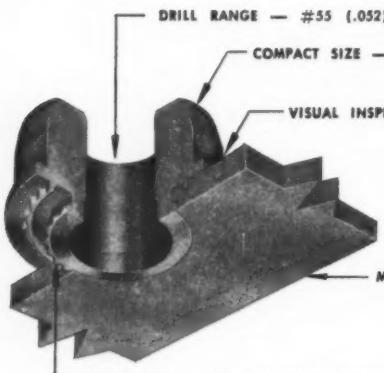
CITY_____ ZONE____ STATE_____

CIRCLE INFORM-A-GRAM KEY NO. 17

Its New!

PRESS TYPE ANCHOR BUSHING

FOR REAL DRILL TOOLING ECONOMY


DRILL RANGE — #55 (.052) THRU 9/64 (.1406).
COMPACT SIZE — MINIMUM HEIGHT ADEQUATELY SUPPORTS DRILL, DIAMETER PERMITS CLOSE LAYOUT.
VISUAL INSPECTION — WHEN BUSHING IS FULLY INSTALLED, ITS SHOULDER SEATS ON TEMPLATE.
MATERIAL — INSTALLED IN .060 OR THICKER ALUMINUM.
SERRATIONS — DOUBLE ROW PROVIDES POSITIVE LOCK.

Inexpensive Press Type Anchor Bushings are simply pressed into punched (or drilled) holes in .060 or thicker aluminum drill templates and offer durable tooling life for high or low volume production.

The compact sizes of these bushings allow you to lay out very close hole patterns, yet the bushings provide the necessary drill support for perpendicular drilling. The double row of serrations at the base provides a positive lock between the bushing and the template to resist drill torque or template abuse.

To simplify template hole preparation, drill sizes are accommodated by only three sizes of bushings:

AB90 #55 (.052) THRU 9/64 (.1406)
AB91 #27 (.144) THRU "F" (.257)
AB92 #G (.261) THRU 7/16 (.4375)

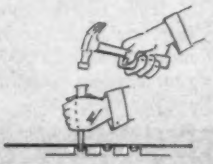
WRITE FOR OUR NEW BROCHURE ON PRESS TYPE ANCHOR BUSHINGS. IT TELLS HOW TOOLING ECONOMIES ARE OBTAINED, GIVES LAYOUT DIMENSIONS, INSTALLATION AND REMOVAL DATA, AS WELL AS ORDERING INFORMATION.

INSTALLATION

1
DRILL OR PUNCH HOLE IN TEMPLATE TO MATCH BUSHING PILOT DIAMETER.

2
PRESS BUSHING INTO TEMPLATE HOLE.

REMOVAL



KNOCK-OUT BUSHING FROM UNDERSIDE OF TEMPLATE.

hi-shear RIVET TOOL COMPANY
2600 WEST 247TH STREET • TORRANCE CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 18

Edward E. Franks, Jr. is now serving as district sales manager in Chicago for the Machine Division of The Torrington Mfg. Co.

Cogsdill Tool Products, Inc. has named **Donald T. Walker** sales manager.

Newly appointed general sales manager of Norton Co.'s Abrasive Division is **Robert Cushman. W. Alex McCune** succeeds Cushman as sales manager of grinding wheels. **Harlan T. Pierpont** is the new sales manager of abrasives, succeeding **George A. Park** who retired; **William A. Russell** takes over as manager of field sales, grinding wheels; and **David H. Paul,** is district manager in Detroit.

Two new sales representatives for the Michigan district sales office of the Metallurgical Products Department, General Electric Co. are **Bruce R. Best,** metropolitan Detroit and Toledo, and **Edward L. Boersig,** eastern Michigan.

Jenks Machinery Co. has appointed **R. G. Knapp, Jr.** sales engineer.

William I. Wilt is serving as vice president in charge of advertising and sales promotion of The Sheffield Corp., a subsidiary of Bendix Aviation Corp.

S. E. Smith, Jr., has become assistant sales manager for The Weldon Tool Co.

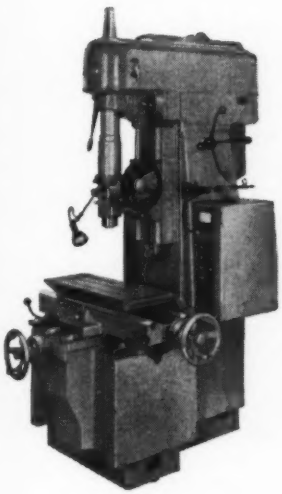
William G. Moles is the representative for Burg Tool Mfg. Co. in the southern states.

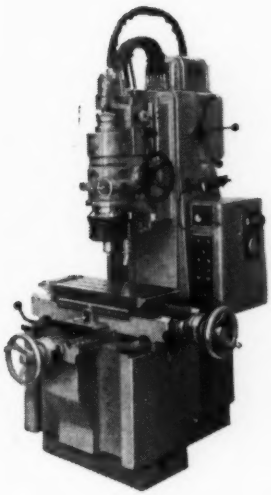
The appointment of **John F. Hines** as sales manager of the Cutting Tool Division of Brown & Sharpe Mfg. Co. has been announced by the company.

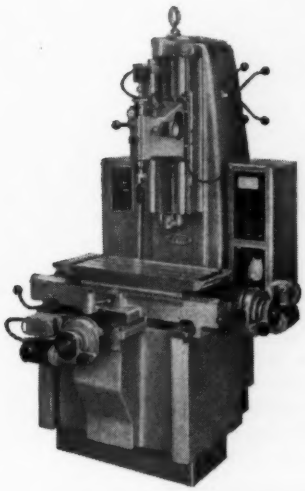
Theodore A. Miller has been named resident salesman at Rockford, Ill., by the Latrobe Steel Co.

Accuracy to the split-tenths

FLASH! All Moore machines shipped after February 15, 1959 are made and calibrated to the New International Inch.







LOCATES AND BORES HOLES TO LESS THAN A "TENTH"

No. 3 Moore Jig Borer

For boring, drilling, reaming and spotting holes in dies, jigs and production parts, the speed and accuracy of the Moore Jig Borer has never been equaled. Now, with this new and larger No. 3 model, you will break the "tenth" barrier! Here's why: it offers more precise positioning tolerances...all hardened, ground and lapped ways...no gibs...no overhang...improved drive...wider speed range 60 to 2250 RPM...larger table working surface, 11" x 24"...micro setting of vernier dial...more accessible cross-clamping. These new features, plus sensitive, centralized controls for spindle speeds and feeds, quick tool-changing, easy lubrication add up to a Jig Borer which belongs in every toolroom where *tomorrow's* accuracies must be achieved *today!*

LOCATES AND GRINDS HOLES TO LESS THAN A "TENTH"

No. 3 Moore Jig Grinder

The originators of jig grinding and the Jig Grinder have done it again! Now, with this new, larger No. 3 model, you can grind—*with split-tenth accuracy*—holes plus regular and irregular contours to size and location after hardening. This is made possible by the closer locational tolerances built into the machine...by the all-hardened-ground-and-lapped ways...by the faster strokes provided for chop-grinding...by the infinite spindle speeds, 40 to 250 RPM...by the larger table working surface, 11" x 24". The same quickly set precision lead screws as in the Moore Jig Borer simplify the finish-grinding process.

MEASURES TO ONE-THIRD OF A "TENTH"

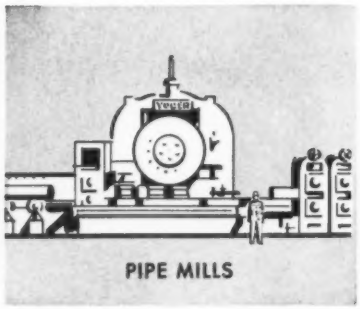
Moore Universal Measuring Machine

This machine, built on the same basic principles as the No. 3 Moore Jig Borer and No. 3 Moore Jig Grinder, introduces a new concept in ultra-precise measurement and inspection. It offers *for the first time:* A machine combining the capacity for larger work-pieces; choice of electronic indicator supported on an accurate, rotatable spindle, or a universal microscope for pickup; a combination of rectilinear and angular positioning, making possible the measurement of the most complex contours. Design and construction insure the highest possible accuracy. All ways are hardened, ground and lapped steel, fitted to hand-scraped cast iron. Table positioning in two directions of travel is by means of master lead screws. Note motorized lead screw drive—it's optional (for Measuring Machine only).

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 19



PIPE MILLS

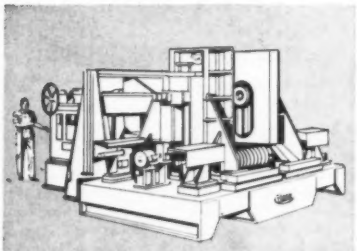
YODER PIPE AND TUBE MILLS

Today's expanding markets and tightening economy demand closer production cost control. YODER'S complete line of ferrous or non-ferrous Pipe and Tube mills can help you meet production schedules economically... help you realize significant savings in the manufacture of tube and pipe.

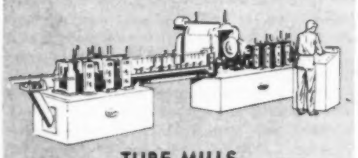
YODER Pipe and Tube mills offer flexible production to meet fluctuating demand. They adapt easily to the most rigorous schedules. Everyday manufacture of constant high quality pipe and tube in diameter of 5/16" to 24". Speeds up to 350 fpm plus can be obtained with YODER mills.

YODER also makes a complete line of Slitting equipment and Cold Roll-Forming machinery. Send for your copy of the fully-descriptive book covering Tube Mill operation.

THE YODER COMPANY
5501 Walworth Ave. • Cleveland 2, Ohio



HEAVY DUTY UNCOILERS



TUBE MILLS

ENGINEERING YODER MANUFACTURING PIPE AND TUBE MILLS (ferrous or non-ferrous)

CIRCLE INFORM-A-GRAM KEY NO. 20

MANUFACTURING MEMOS

Sage Advice . . . A group of retired research executives of some of the largest companies have banded together to form a novel association called Technically Experienced Associates, Mobilized, or TEAM, Inc. These men have formed TEAM "to make their wide research experience available for the benefit of mankind, without entering into competition with commercial consulting organizations or individuals," says President Herbert W. Graham. Know-how in many fields is represented.

X-Ray in QC . . . X-ray diffraction in industry, until now mostly a laboratory tool, looks like it will become a strong quality control tool in the years to come. This is the belief of Dr. David Harker, director, Protein Structure Project, Polytechnic Institute of Brooklyn, who singled out the automotive, aviation, chemical, metalworking, mining, plastics, concrete, and textile fields as the most likely areas of use.

New ASM Slate . . . It's the end of the year, but it's just the beginning for the new officers of the American Society for Metals. They include Walter Crafts, Union Carbide Metals Co., president; William A. Pennington, University of Maryland, vice president; Robert J. Raudebaugh, International Nickel Co., treasurer; and Walter E. Jominy, Chrysler Corp., secretary.

Growing Pains . . . The never ending industrial expansion continues. Burgess-Norton Mfg. Co. recently bought industrial buildings and 24 acres to make available 140,000 sq ft of floor space for growing production.

After 14 years growth Universal Grinding Corp. is erecting a 27,000 sq ft addition to its present 23,000 sq ft plant to house more grinding machines to handle 15 types of grinding operations.

Manufacturing, engineering, and research of Micrometrical Mfg. Co. scattered in five buildings will soon be housed under one roof when their new 30,000 sq ft building in Ann Arbor, Mich. is finished.

A multi-million dollar engineering-research and manufacturing facility will be built by The Norden Division of United Aircraft Corp. on a recently acquired 80-acre tract in Norwalk, Conn. The 350,000 sq ft building should be finished in a year.

AUTOMATIC PRODUCTION is faster, more accurate, more profitable

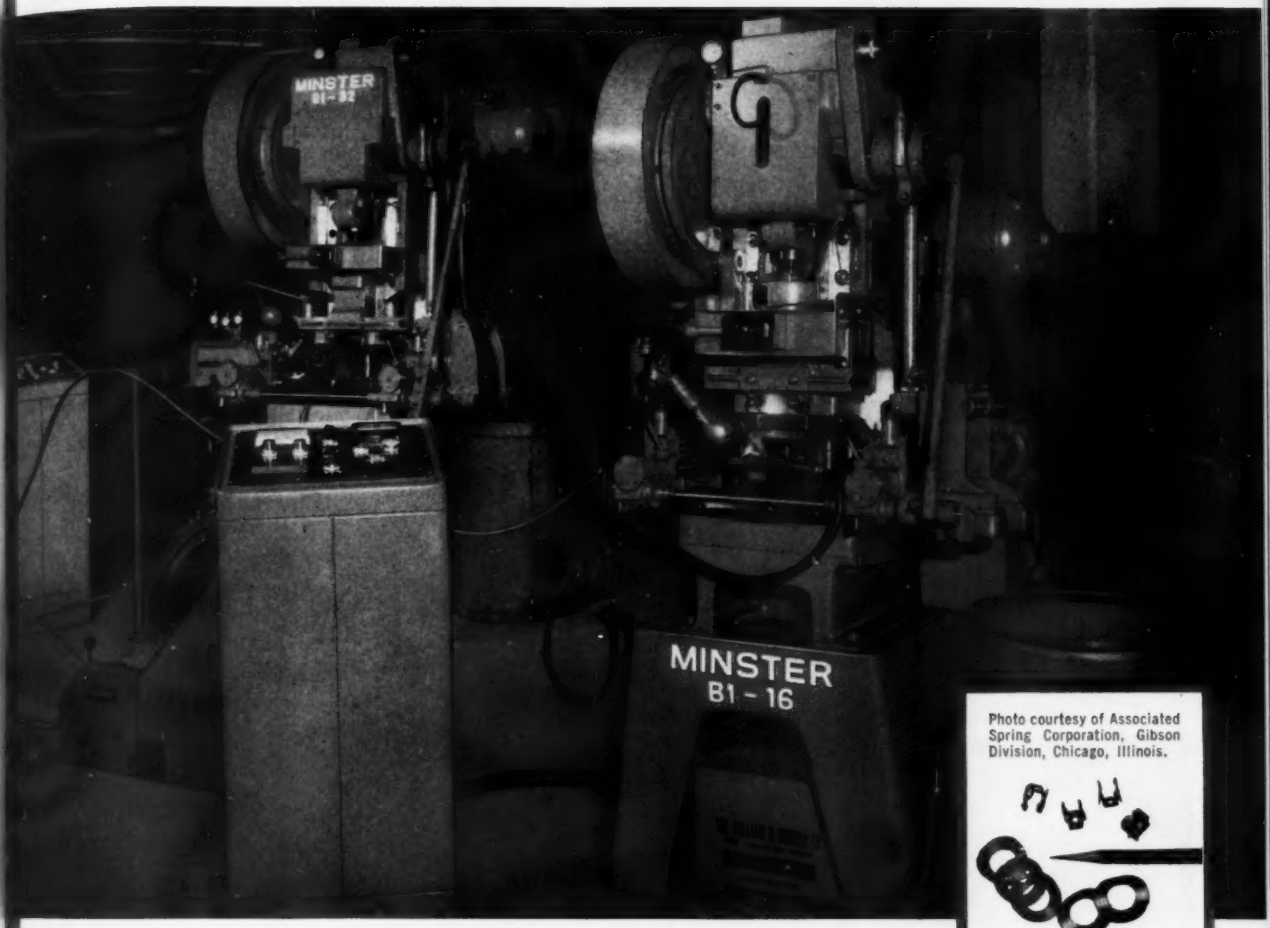


Photo courtesy of Associated Spring Corporation, Gibson Division, Chicago, Illinois.

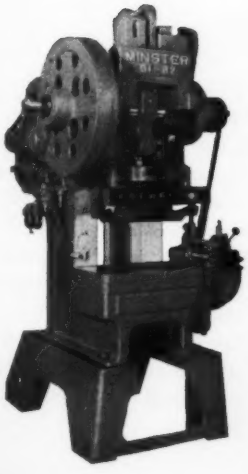
Minster B1 High Speed Gap presses range in capacity from 16 to 60 tons. They're compact and highly efficient for long or short run small parts production from coil stock.

Minster B1 High Speed Gap Presses

You gain in many ways when you run single or multi-stage jobs automatically at high speeds. You increase production and slash costs. Less equipment is needed, cost per part is lower and that means more profit.

Automatic production is always *most* profitable when you take advantage of Minster's technical knowledge and wide range of presses and feed equipment. Minster matches the proper type and size of press and feed to your requirements . . . gives you maximum versatility in material size and job selection.

Let us show you the best way to run your jobs automatically—at greater profit. Write or call today.



The Minster Machine Company • Minster, Ohio

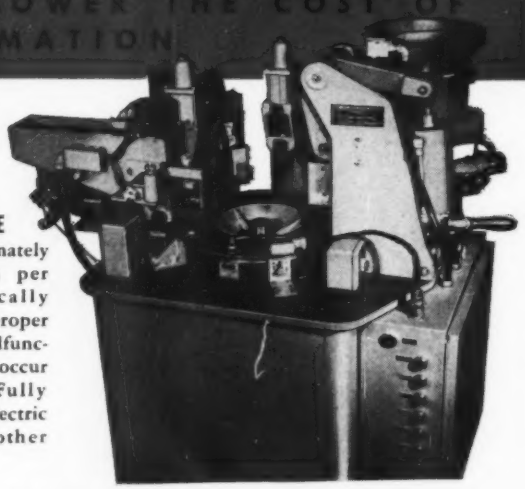
MINSTER®

CIRCLE INFORM-A-GRAM KEY NO. 21

Specify

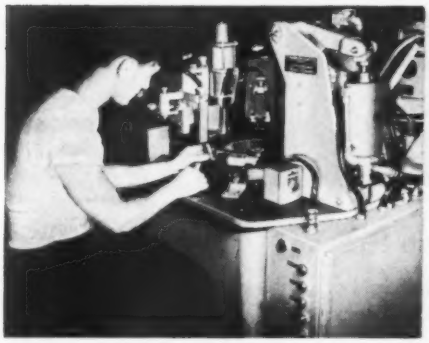
Standard Tool *building blocks*

AND LOWER THE COST OF AUTOMATION



8-STATION ASSEMBLY MACHINE produces approximately 1500 assemblies per hour, automatically indicates any improper loading or any malfunction which might occur at any station. Fully equipped with electric interlocks and other safety devices.

Rockwell Manufacturing Co., Hopewell Division, now automatically assembles 4 different size double ball check assemblies of two types with a machine designed and built by Standard Tool and Manufacturing Co. incorporating a model ST-A9A indexing unit, Standard Cabinet base, and other precision "building block" components.



OPERATOR MANUALLY LOADS ball check body at **Station 1** (All other operations are completely automatic.) **Station 2** Small ball is loaded. **Station 3** Impact tool forms ball seat. **Station 4** Larger ball is loaded. **Station 5** Impact tool forms larger ball seat. **Station 6** Pin is inserted to hold assembly, or, **Station 7** Top of body is crimped. **Station 8** Completed ball check assembly is ejected.

Changeover from one size or type to another is quickly accomplished and simplicity of design makes it foolproof.

The heart of this Automatic Machine is the ST-A9 indexing unit available in many sizes and types to meet most rapid assembly and manufacturing needs.

Technical Booklets Sent on Request!

Standard Tool engineers will be pleased to help you in selecting the indexing unit to meet your exact requirements.

Also ask for Standard Tool facilities brochure.

Machinery Division

STANDARD TOOL & MANUFACTURING CO.

Better Products at Lower Costs thru Better Methods

252 LAUREL AVENUE **KEARNY, NEW JERSEY**

STANDARD TOOL AUTOMATION

Since 1910

CIRCLE INFORM-A-GRAM KEY NO. 22

MANUFACTURING MEMOS

European Interest

Giddings & Lewis Machine Tool Co. has acquired a large interest in a German firm, Nassovia Werkzeugmaschinenfabrik, manufacturers of high-class precision machine tools.

Change of Hands

Master Mfg. Co., Inc. has been acquired by The Dumore Co.

Accurate Specialties Co., Inc. now holds 80% of the common stock of Duramic Products, Inc.

Production Rise

The 1959 forecast of the United States Chemical Milling Corp. appears that non-defense production has doubled over last year. On projected increased sales for this year, 60% will be defense and 40% non-defense in comparison to last year's 80%-20% breakdown.

New Divisions

Fawick Corp. has established a new Hydraulic-Electronic Div'n with Ray G. Holt as manager.

Manager of the newly created Industrial Controls Division of Minneapolis-Honeywell Regulator Co. is Ray R. West.

Merger

True-Trace Corp. is the name now being used following the merger of True-Trace Corp. with True-Trace Sales Corp. and True-Trace Mfg. Corp.

Changing Lines

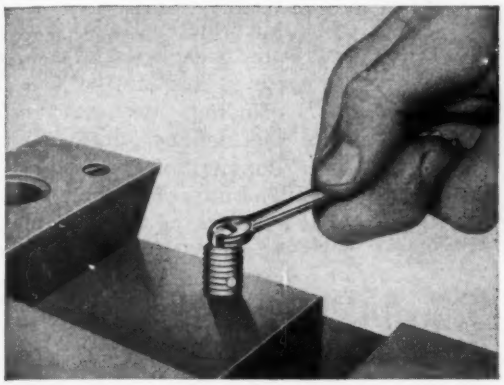
The Ohio Knife Co. has purchased the manufacturing rights to the John M. Rogers patented, inserted blade type reamers and mills from The Oak Engineering Co.

The E. F. Vilter Co. has sold its line of machine tool attachments to The Zierden Co.

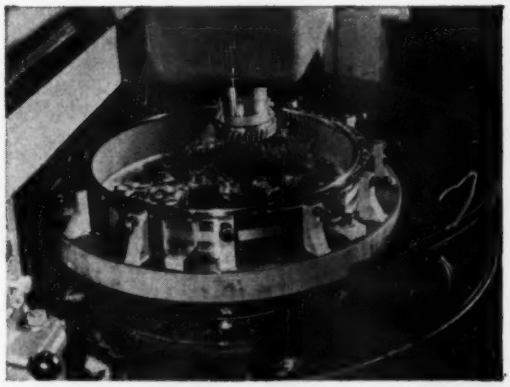
Practical Tooling Tips

No. 4 of a series

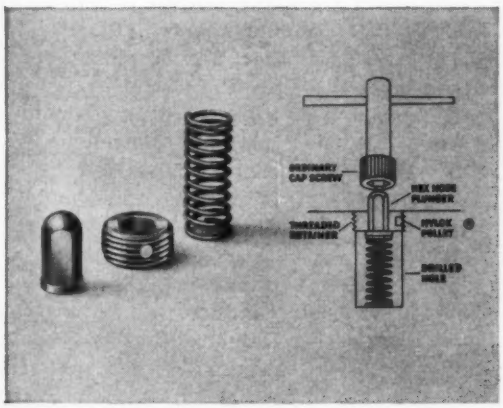
New uses are being found every day for Vlier Tooling Accessories. Perhaps the applications shown below will suggest ways you can profit by replacing costly, custom devices in jigs, dies and fixtures with precision, off-the-shelf Vlier products.



HEX NOSE SPEEDS INSTALLATION OF SPRING PLUNGERS—Vlier Hexnose Spring Plungers are easily installed with a simple end wrench. Eliminates hunting for special wrenches. Made to same exacting tolerances as Vlier Standard Spring Plungers. Available in many end pressures, diameters and lengths.



THIN-WALLED RING GEAR HELD SECURELY in fixture without distortion with 12 Vlier Torque Thumb Screws. Once pre-set end pressure is reached, knurled head spins freely, preventing overtightening. Checknut prevents backing off under vibration. Available in four types; various screw diameters and lengths.



NEW PLUNGER ASSEMBLY PREVENTS DAMAGE TO DIE STOPS—Plunger actuates automatic stop perfectly. Quickly installed, never needs adjustment. Hex nose mates with standard hex head bolts for easy insertion. Nylok® nylon pellet prevents threaded retainer from working loose. 6 sizes from ¼" to 1" diameter. Various end pressures.

FREE IDEA BOOKLET—Illustrations in this 16-page booklet show how others have profited from the use of Vlier Tooling Accessories. Shows both the usual and unusual applications. May suggest ways *you* can save. Write for your copy today.

VLIER
Engineering Corporation
A subsidiary of Barry Controls, Inc.
8900 Santa Monica Blvd. • Los Angeles 46, California

CIRCLE INFORM-A-GRAM KEY NO. 23

Specify the

T-J Spacemaker

for longer, more efficient cylinder service

You too—can reduce replacement expenditures—lower maintenance costs with the T-J Spacemaker cylinder line. Designed and engineered for ruggedness, and accuracy of operation, the Spacemaker assures longer, uninterrupted operation.

The T-J Spacemaker eliminates tie-rods, gives greater strength, saves space . . . and reduces costs in all push-pull operations. Immediate delivery in a complete range of styles and capacities . . . air or oil. Write for Bulletin SM 155-4, today. The Tomkins-Johnson Company, Jackson, Michigan.

WITH EXTRAS . . . AT NO EXTRA COST

1. METAL PISTON ROD SCRAPER—protects rod packing, cylinder bore and rod surface by removing all foreign particles.
2. NEW "SUPER" CUSHION for air or METALLIC SELF-ALIGNING MASTER CUSHION for oil.
3. HARD CHROME PLATED CYLINDER BORES AND PISTON RODS for greater protection and reduced wear.
4. ONE PIECE PISTON assures better alignment, longer bearing and packing life.
5. FORGED SOLID STEEL HEADS throughout entire line.
6. PILOTED PACKING GLAND with extra long bearing for additional strength and support to piston rod.
7. NO TIE-RODS TO STRETCH—gives you 360° port rotation . . . less space used . . . full strength.
8. STREAMLINED DESIGN . . . operating pressures to 200 PSI, air; 1,000 PSI oil, non-shock.

T-J TOMKINS-JOHNSON
RIVETORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS

CIRCLE INFORM-A-GRAM KEY NO. 24

MANUFACTURING MEMOS

On The Move

Darwin & Milner, Inc. is getting settled in new quarters with four times as much space as their old facilities. The 16,500 sq ft can handle more stock and sizes for fast steel delivery.

Representatives

Micromatic Hone Corp. is now exclusive sales and service source in the U.S. for grinding machines manufactured by A. A. Jones & Shipman of Leichester, Eng. Thoreson - McCosh, Inc. is now being represented in western Wisconsin, Minnesota, and North and South Dakota by The Chas. W. Stone Co.

Latrobe Steel Co. has appointed Mahar Tool Supply Co., Inc. to handle users in the Saginaw Valley.

New distributor in the Philadelphia area for Sandvik Steel, Inc. is Griffith-Raguse & Co., Inc.

Coming Events

Dec. 2-4. The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers' 1959 Electric Furnace Conference. Cleveland Hotel, Cleveland.

Dec. 3-4. Tax Institute's Symposium on The Impact of Taxation on Management Responsibility for Investments and Operations Abroad. Mayflower Hotel, Washington.

Dec. 15. Annual Meeting of The Material Handling Institute, Inc., Savoy-Hilton Hotel, New York.

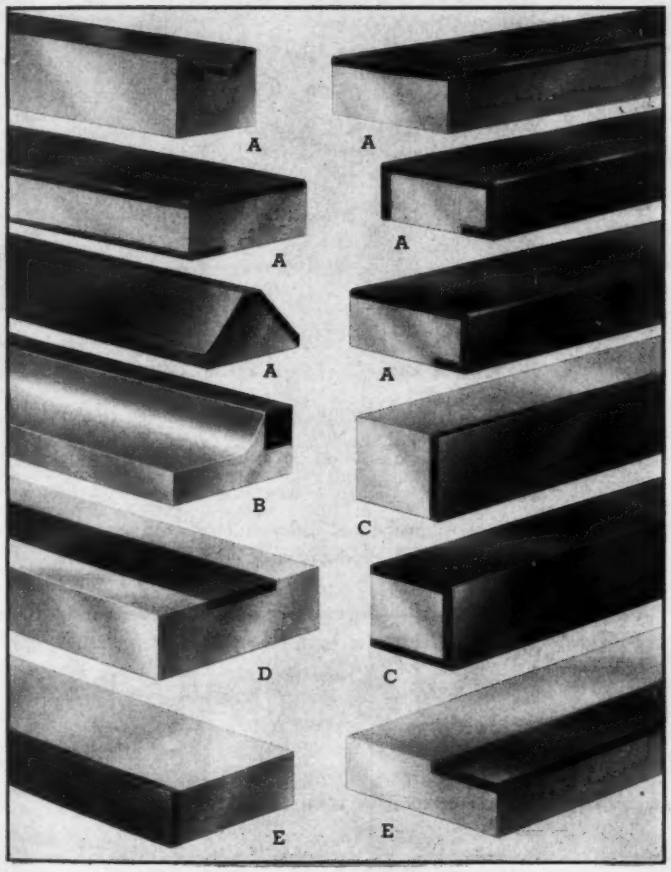
Dec. 15. Annual Meeting of Association of Lift Truck and Portable Elevator Manufacturers, Savoy-Hilton Hotel, New York.

Dec. 16. Annual Meeting of Industrial Truck Assoc., Savoy-Hilton Hotel, New York.

O-KNI-CO MACHINE TOOL news
PRODUCTION FACTS THAT INCREASE YOUR PROFITS
PUBLISHED BY THE OHIO KNIFE CO., CINCINNATI, OHIO

NEW READY MADE STANDARD HARDENED SHAPES SAVING MONEY FOR HUNDREDS OF COMPANIES

USED FOR DIES, DIE SECTIONS, FLANGE SECTIONS, WAYS, GIBS, RAILS, WEAR PLATES. CARRIED IN STOCK BY OHIO KNIFE CO., CINTI., OHIO.



A—Hardened Ways and Slides B—Composite Die Sections
C—Heel Block D—Center Clad E—Flange Slide

Over 12 standard cross sections in over 80 sizes now available.

The multiple use of these sections by machine tool builders, die makers, etc., has increased tremendously. Great savings are achieved by being able to order from stock and in lengths up to 120". They are delivered to the customer with cutting, forming or wear surface already machined, hardened and ground. The soft steel backing, to which specially hardened tool steel is clad, can be drilled quickly for dowel and screw holes. The special O-Kni-Co hardening process (65-66) Rockwell to the full depth of tool steel along the entire length of the section develops tremendous wear resistance. They are precision made to the closest tolerances. Also available are clad aluminum bronze wear plates (¼" thick aluminum bronze clad to a tough, easily machinable steel base.)

FREE technical literature available. Check off—mail coupon today.

THE OHIO KNIFE CO., Dept. 100LL
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☐ BULLETIN-A describing 12 standard cross sections in over 80 sizes

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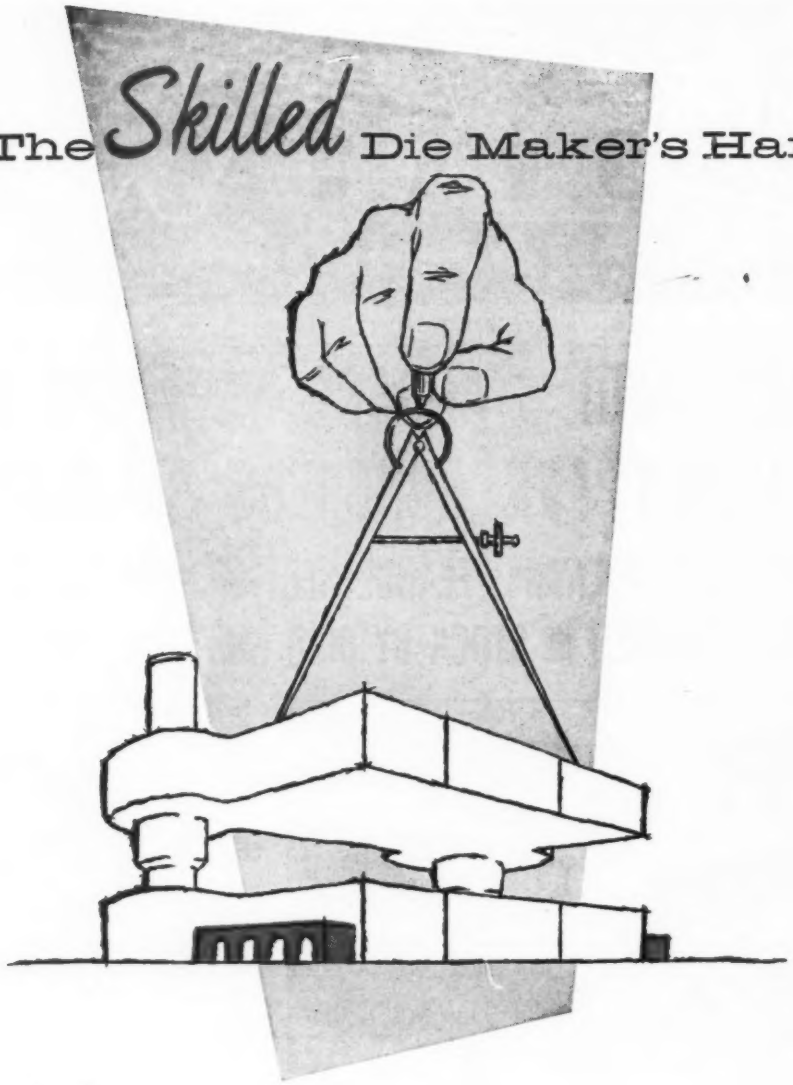
CIRCLE INFORM-A-GRAM KEY NO. 25

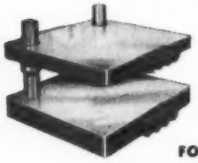
For The *Skilled* Die Maker's Hands...



Precision DIE SETS FOR OVER 35 YEARS

Superior has pioneered many firsts in the die set industry and today still sets the standard for new innovations that eliminate guess work, help speed production of dies and eliminate unnecessary handling.

With over 35 years of experience in the die set industry Superior engineers are constantly working to develop new and better die sets to serve all industries from Rockets to Refrigerators.



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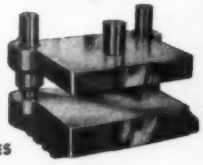

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DENVER 1, COLORADO
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FAIRFIELD, CONN.
Edison 4-4282

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RACINE, WISCONSIN
Melrose 2-1900
WARWICK, R. I.
Turner 4-2907

MELROSE PARK, ILLINOIS
Fillmore 5-5910
SYRACUSE, NEW YORK
Granite 4-0458
CHESHIRE, CONN.
Browning 2-4887
WEST NEWTON, MASS.
Bigelow 4-2070 & 2-6771
UNION, N. J.
Murdock 8-2270

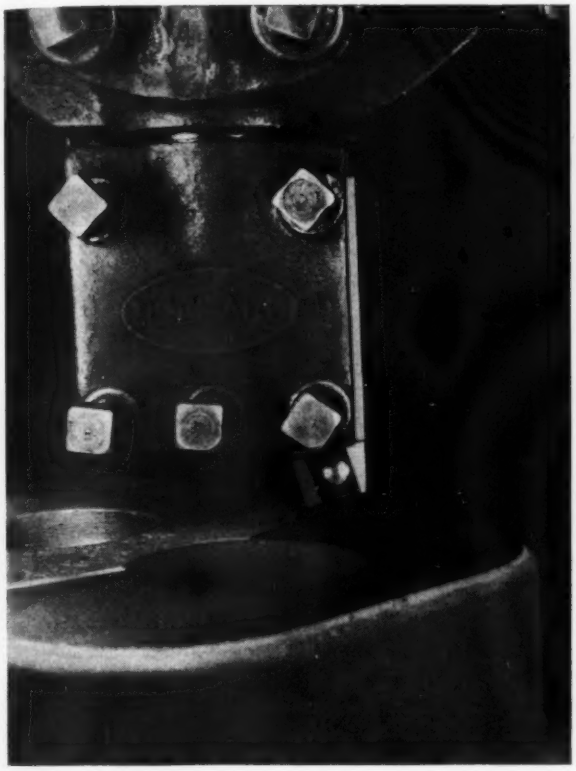
BALTIMORE, MARYLAND
Belmont 5-2780 & 5-9492

2 plants to serve you
MILWAUKEE, WISCONSIN
Mitchell 5-6027
PLAINVILLE, CONN.
Sherwood 7-2761

CIRCLE INFORM-A-GRAM KEY NO. 26

THEY SPEND MORE pennies

TO MAKE MORE dollars



Without coolant, this Bullard lathe makes a .125 rough cut and .050 finish cut using Kennametal Grade K6 inserts in a Kendex* (patented) holder. Sand holes in the castings add to the difficulty of an interrupted cut. Photos and production data courtesy of American Coleman Company, Littleton, Colorado, manufacturers of trucks, tractors, front drive axles, and related parts.

	50 RPM 24 Minute Tool Life	88 RPM 15½ Minute Tool Life
Feed	.027	.027
Cutting Time:		
First side—rough cut	7 minutes	4½ minutes
First side—finish cut	7 minutes	4½ minutes
Second side—rough cut	5 minutes	3¼ minutes
Second side—finish cut	5 minutes	3¼ minutes
Total cutting time	24 minutes	15½ minutes
Machine cost per hour	$6.00	$6.00
Tool cost per hour	.075	.27
Machine and Tool cost/8 hours	$48.60	$50.16
Pieces finished per 8 hours	5	9
Cost per piece	$9.72	$5.57

KENNAMETAL* tooling permits 75% SFM increase... cuts cost per piece almost in half

Like many others, this plant is sacrificing pennies in tool costs to make dollars in production profits. At 50 rpm, this boring mill faced cast iron housings at a maximum speed of 289 sfm. Each Kennametal cutting edge faced both sides of two pieces with production averaging 5 pieces per 8-hour shift. When the maximum speed was increased to 510 sfm, the cutting insert had to be changed for each piece.

This reduction in machining time, plus some additional time saved by an improved method of holding the workpiece, enabled production to increase to 9 pieces per shift.

Sacrificing a few pennies of increased tool costs to make dollars in production profits is not a new idea. It has been proven-in-use by many progressive plants, and we will gladly send you records of such operations. These results can be duplicated in other plants where machines and talented operators have been held back by old ideas about tooling and tooling costs.

Ask your Kennametal Carbide Engineer how Kendex* (patented) tooling can help you get more efficient output from *your* machines . . . or write direct for the booklet, "There's Profit in Retiring a Tradition." KENNAMETAL INC., Latrobe, Pennsylvania. 97237

*Trademark

INDUSTRY AND KENNAMETAL ...Partners in Progress

CIRCLE INFORM-A-GRAM KEY NO. 27

NEW HYDRAULIC

6"x18" SURFACE GRINDER

No. 10-H

MICRO-PRECISION

Price $2985.00 Complete

MICRO-PRECISION

MICRO-PRECISION

A tremendous VALUE and a terrific, micro-precision performer. Priced low enough for any shop, but built to outperform models costing much more! Look at these superior Covel 10-H features!

HYDRAULIC
RAPID TRAVERSE
A plus feature not usually included on a grinder under $3000 price range. Saves time in work positioning. Adjusts to slower speeds for wheel truing.

ALL-NEW
HYDRAULIC SYSTEM
Under test and development for more than four years. Covel's unique, simplified hydraulic system brings you all the benefits of hydraulic feed for less while maintaining top performance . . . table speeds from 10 to 70 ft. per minute.

MICRO-PRECISION

BIG 16½" VERTICAL CAPACITY
Extra vertical capacity lets you do more jobs on the Covel 10-H, even those extra-tall jobs most grinders won't touch.

HYDRAULIC
HIGH SPEED TABLE
Infinitely variable hydraulic feed from 10 to 70 ft. per. minute or may be hand fed. Cross feed also infinitely variable, rapid or hand, from .005" to .250"

Micro-Precision a Covel Tradition-Since 1874

COVEL ***PRECISION*** GRINDERS
BENTON HARBOR, MICHIGAN

Write, wire or call TODAY for complete information and prices on the 10-H and the complete line of Covel Precision Grinders. Ask for Bulletin T-129.

CIRCLE INFORM-A-GRAM KEY NO. 28

MEN YOU SHOULD KNOW

Now serving as vice president of manufacturing for all Leece-Neville Co. divisions is **George B. Howell.**

C. Robert Stone was recently named chief production engineer at Potter and Brumfield.

The Elwell-Parker Electric Co. has named **Robert G. Vance** chief development engineer.

Taking over as manager of quality control at Latrobe Steel Co. is **Richard P. Simmons.**

The board of directors of the United-Greenfield Corp. has elected **Woodrow Tichy** a vice president. He continues also as general manager of the Whitman & Barnes Division.

Appointment of **O. J. Maha** as president and general manager of Hannifin Co., Division of Parker-Hannifin Corp. was recently made known. He succeeds **Ellwood G. Peterson** who continues as vice president and director of Parker-Hannifin Corp. Heading new divisions are **H. H. Adams,** Power Cylinder Division; **M. E. Lawrence,** Machinery Division; and **Z. J. Lansky,** Air Valve and Crown Division.

PIC Design Corp. announced the appointment of **Rowland F. Schwenker** as vice president and general superintendent.

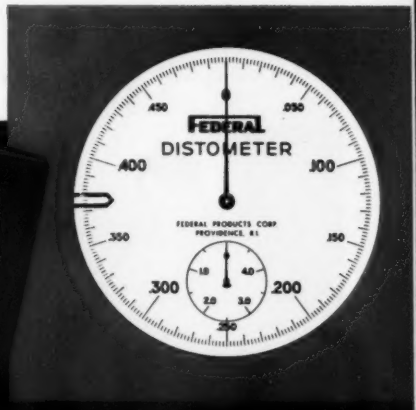
Promotion of **Clifford L. Johnson** of AC Spark Plug Division of General Motors to manufacturing manager of Hyatt Bearings Division was recently announced. **James L. Elliott** succeeds Johnson as director of production engineering at AC.

Staff changes at Landis Machine Co. include election of **Leslie M. Hess** as vice president and assistant general manager; **H. L. Steck,** controller-treasurer; **E. C. Hanna,** director of engineering; and **George W. Lyman,** chief research engineer.

. . . Continued on page 30

Right before your eyes...

A 27% (or more) INCREASE in LATHE PRODUCTIVITY!



Push-Button Zeroing . . . you're instantly and automatically ready to measure off the next distance.

The DISTOMETER, a totally new precision instrument, greatly increases lathe output . . .

Because —

- It provides a much faster, more convenient and more reliable means of spotting tool position and measuring longitudinal cutting distance than any other available device.
- It has motorized, Push-Button Zeroing. Lets you reference instantly at any point in the carriage travel for continuous measurement to any other point.
- It puts accurate, well magnified, man-size readings in front of the operator so he can follow progress of the tool and know instantly when it has covered the required distance.
- It requires no set up, no positioning, no mastering. Ready to measure *directly* at the touch of a button.

ANY MANUALLY OPERATED LATHE . . . OLD OR NEW . . . BIG OR SMALL . . . CAN USE THE DISTOMETER PROFITABLY!
Write for brochure.

FEDERAL PRODUCTS CORP.
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Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .
Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

CIRCLE INFORM-A-GRAM KEY NO. 29

Automatic Gaging Now Profitable For Short Runs

If you have short run jobs requiring close tolerance control, Automatic Gaging can now provide important economies available heretofore only in mass production operations.

Typical is an automatic gage now in use by a bearing manufacturer. This machine with quick-change tooling inspects and classifies 12 different types of parts in an 8 hour shift. Bushing type parts from the bar machines are automatically segregated into 7 size classifications involving OD, ID and width. The savings are significant.

It protects product quality by 100% inspection

•

It reduces inspection time to a minimum

•

It eliminates the costly errors of manual inspection

•

It has become economically sound due to the recent developments which have given the automatic gaging machine a high degree of flexibility.

Investigate automatic gaging for your operations. Write the Sheffield Corporation, Dayton 1, Ohio, U.S.A., Dept. 20.

the SHEFFIELD corporation
of Bendix Aviation

manufacture and measurement for mankind

8407

CIRCLE INFORM-A-GRAM KEY NO. 30

. . . Men from page 28

Edward M. MacDougall is now serving as general manager of The Richard Brothers Punch Division of Allied Products Corp.

New supervisor of metallography at Adams Carbide Corp. is **Jack H. Powers.**

Three automotive production men have been named by Hercules Motors Corp. **J. G. Rongitsch** is now assistant to the director of manufacturing; **Keith D. Evans,** takes over as manager of quality control; and **Alfred A. Novelli,** is on special assignment to the director of manufacturing.

W. Thomas Gettig, assistant to the vice president of Rockwell Mfg. Co.'s Meter and Valve Division, has been named vice president and general manager of the LFM Mfg. Co., a wholly-owned subsidiary.

Recently appointed manager of development and research for The Heald Machine Co. is **George H. Lockwood.**

New assistant vice president and manager of gaging and automation systems divisions of The Sheffield Corp. is **Louis Polk, Jr.**

Election of **Harold D. North, Jr.,** as president of The Ferry Cap & Set Screw Co. has been announced by the company.

The Hanson-Whitney Co. recently announced the election of **Brenniss G. Tyrrell** as executive vice president and **Oliver B. Ellsworth** as chairman of the board of directors.

Chester E. Grigsby, vice president and director of American Steel Foundries and general manager of its Transportation Equipment Division, became head of this division, succeeding **Charles L. Heater** who retired.

Argo G. Pison has been appointed manager of quality control of Bridgeport Thermostat Division, Robertshaw - Fulton Controls Co.

New president of Castings Engineers, a division of Consolidated Foundries & Mfg. Corp., is **Joseph H. Cadieux.**

1½ times actual size

220 MILLION PIECES

FROM THIS 12-STATION TOOL STEEL DIE

Photo courtesy of Werner Die & Stamping Co., Cary, Illinois, makers of this die.

Tolerances on the intricate shaft-mounted spring shown here are plus .003", minus .000" . . . no burrs allowed . . . and stamping speed is better than 240 a minute. This calls for die-making precision—and a precision die set.

Reliable, consistent precision of the Danly Die Set provides the closure accuracy necessary to the performance of this fine die. After this unusually long run of a precision stamping in a tool steel die, the die set is in good condition.

Danly production methods consistently maintain the highest standards of die set precision through individual control of every critical dimension. Thousands of fine tool and die shops agree that the finest die set obtainable is usually the lowest cost insurance on any die-making investment. Find out how Danly precision can save money for you.

Write for new folder on
"The Importance of Die Set Precision"
Lists and discusses all critical dimensions . . . shows how and why consistent Die Set precision is vital in every die-making operation.
Send for a free copy.

Branches and Distributor Assembly Plants in all Toolmaking Centers

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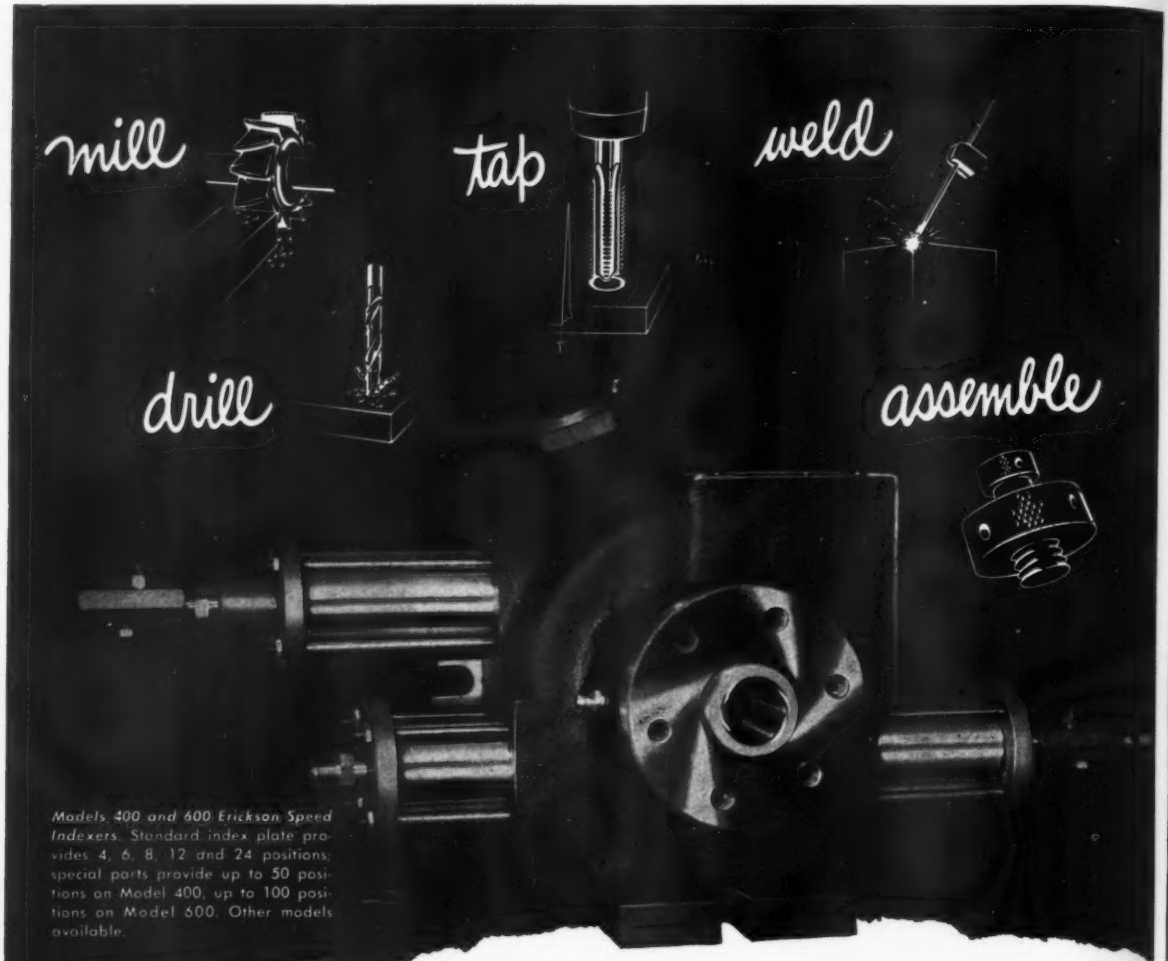
DANLY MACHINE SPECIALTIES, INC./2100 SOUTH LARAMIE AVE., CHICAGO 50, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 31



Models 400 and 600 Erickson Speed Indexers. Standard index plate provides 4, 6, 8, 12 and 24 positions; special parts provide up to 50 positions on Model 400, up to 100 positions on Model 600. Other models available.

Angular accuracy within 2 minutes... repetitive accuracy in low "tenths" of a thousandth

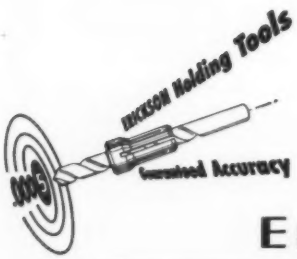
ERICKSON INDEXERS–

the economical way to smash automation bottlenecks

Even the most elaborate automatic production line can bog down *expensively* without rapid and accurate automatic parts positioning.

That's where Erickson Indexers really pay off. For you can interlock them into your production set-up with micro switches and solenoid valves. The hardened and ground lock pin operates in conjunction with the actuating mechanism to assure *positive positioning and angular accuracy within 2 minutes of a degree.* (Repetitive accuracy is no indication of angular accuracy. Erickson holds repetitive accuracy in low "tenths" of a thousandth.) And Erickson Indexers can maintain this great accuracy because their adjustable, self-contained shock control unit delivers a cushioned rotary load to the mechanism, thereby reducing wear.

Speed to keep lines moving . . . accuracy to reduce rejects . . . long life to cut maintenance and capital investment – all add up to Erickson Indexers, the *economical* way to smash automation bottlenecks.



Write for Erickson Catalog K today! **You'll find many interesting applications for all Erickson holding tools. Take advantage of our free engineering service. An Erickson field engineer will gladly work with you for production economy.**

ERICKSON TOOL COMPANY

34451-12 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

AA-2137

CIRCLE INFORM-A-GRAM KEY NO. 32

CRASHING THE COST BARRIER

THE COST BARRIER which confronts manufacturing management today is one which separates sales from no sales, profit from loss and, ultimately, survival from disaster.

If this seems too strong a statement for you to accept, cut its implications by half and we still have a challenge that will take metalworking's best brains, economics, productivity, innovations and ingenuity to meet.

However thin you slice it, what it adds up to is that some of your competitors are doing more about cost reduction than others — some are leading, and some are trailing. Consequently, you have your own pretty good idea as to just who will be around ten years from now, and who will have fallen by the wayside.

Editorially, it is our job to keep you on top of the trends, developments, and accomplishments in applying cost reduction practices to your production. Our sole evaluation of an editorial presentation becomes: Will it help you crash a cost barrier? This is our yardstick — be it re-tooling — automatic assembly — reliability engineering—hydraulic and pneumatic controls — heat treating or cold working.

It is our job to communicate these findings; as it is yours to study them in terms of your current performance — what and where you can improve to effect cost reductions, and, most importantly, what your competitor could be doing toward the same end.

Today's communications make no secret of potential cost reduction methods and the need for them. Our editorial staff keeps these lines open, feeding you the observations, "success stories" and research and development accomplishments which we accrue through plant visits, technical conferences and demonstrations.

At these gatherings we see you and your competitor there for the one and only purpose of improving your positions cost-wise. Your crying need now for crashing the cost barrier is no hush-hush matter. Adjusted as you may have become to being in competition with your domestic competitor, both of you are now bucking the foreign import that's showing up in your field.

With his lower costs, the fractional labor rate he pays, his hunger for a slice of your marketing pie, you and your domestic competitor are under still greater pressure to modernize, update your methods, and re-tool the last bit of fat out of your cost and selling price.

A few weeks ago we were with many of you at the Cincinnati Milling Machine Company's 75th Anniversary disclosure of new machines, methods and controls. We saw you — and your competitor — evaluate each demonstration in terms of "what will this do for me?" — "how much more thrust will this new setup give me against my cost barrier?"

We hope you were as impressed as we were by the number of new machine tools you saw throughout "the Mill's" production areas: some 270 machines purchased and put to work in the past five years! This communication from them you heard loud and clear, "We practice what we preach!"

Still more recently, nearly thirty of you were "classmates" with Managing Editor Carol Reuss, enrolled in one of Kearney & Trecker's "Milwaukee-Matic" two-day workshop sessions.

When the school bell rang you appeared with drawings and sample workpieces under your arm — representative of cost barriers you are facing. You knew what these pieces were costing you to produce. You and your management invested dollars and manhours to find out what a tape-controlled manufacturing machine could do to the costs you've been living with. You were shown how to convert your drawings to a punched tape, and the machine "communicated" new operating figures on tools, tool changes, and machine-hours per workpiece for you to evaluate.

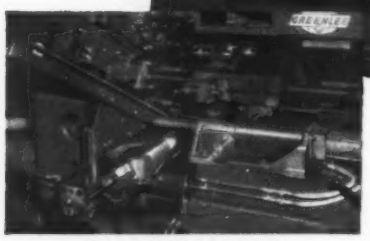
Cost reduction communications come in many sizes, styles and flavors. Some are hard to take, but in the face of rugged competition it doesn't take much prove-out in cost reduction to sugarcoat a bitter pill.

Be it editorial page, advertising page, plant visit, technical society program or trade show, today's communicable knowledge on crashing the cost barrier is there for those who seek it.

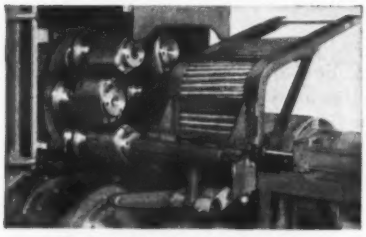
E. Willard Pennington

Editor

Second Operation



MAGAZINE LOADING



REAR LOADING MAGAZINE

HAND LOADING

A Method of Machining That Pays Off

Greenlee standard Automatic Bar Machines, adapted for second operation work, profitably machine a wide variety of parts. Long shafts or short pieces are automatically loaded into the work spindle by any of the various loading arrangements shown. Parts are loaded in one position during the machining cycle, and machined in the remaining five cross slide and end working positions. For more information, see your Greenlee Distributor.

GREENLEE STANDARD AND SPECIAL MACHINE TOOLS

- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Die Casting Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines

WRITE FOR CATALOG No. A-405

GREENLEE BROS. & CO.

1744 MASON AVE. ROCKFORD, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 34

Second of a Series

Metallurgically Speaking

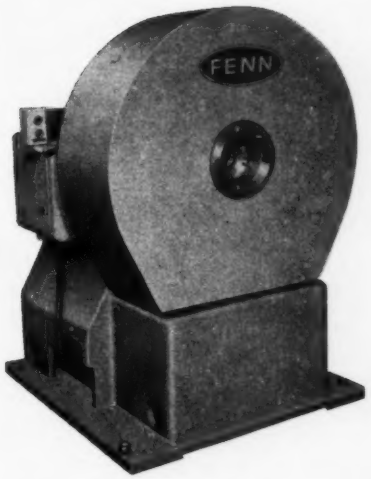


Fig. 1. A swaging machine.

. . . about rotary swaging

by Keith Bernhardt

Conclusions as to the advantages of rotary swaging, presented in last month's article, are backed up here by an investigation of the metallurgical aspects of rotary swaging. These physical and metallurgical tests, conducted by Fenn's Engineering Department and checked by an independent research laboratory, present interesting results that should open new horizons to the process engineer.

SWAGING TESTS COVERED HERE were conducted on a #4F rotary swager (Fig. 1) using conventional die design. The machine used was a stock 7½ hp model and all reductions were accomplished in one pass.

The two materials selected for testing were a low carbon cold rolled steel rod, and a 2024 ST aluminum rod. In both cases the starting diameters were 0.875" and area reductions were to be 22%. All surfaces were clean and clear of lubricant which might affect the end results.

Physical properties of the material were examined before swaging and after swaging, taking into consideration its effect on 1) hardness, 2) elastic limit (yield point), 3) ultimate strength, 4) surface finish, and 5) material density.

The first test on steel brought the rod down to 0.770" dia. It was then sectioned longitudinally, etched, polished, and examined under a metallurgical microscope. An enlargement is shown in Figure 2. This clearly indicates that grain flow is not interrupted by metal movement and that a smooth continuous proportionally refined grain resulted.

The table in Figure 3 gives other results. The increase in elastic limit (yield point) of approximately 10% without any noticeable increase in ultimate strength is of particular interest as is the improvement in surface finish. Starting with a turned finished rod of 150 rms the surface finish was improved to 15 rms.

Results of the second test, on aluminum, start with Figure 4. This again is a 1½ times enlarged photograph of the longitudinal section after etching and polishing indicating no interruption of grain flow and good refinement. When subjected to the same metallurgical and physical tests a substantial increase in the elastic limit was noted. The table in Figure 5 illustrates the increase from 47,900 psi to 79,900 psi, or an increase in usable strength of 67%. The ultimate strength was increased from 68,500 psi to 82,000 psi, or an increase of only 19%.

Of particular interest is the fact that by rotary swaging the usable strength of the aluminum alloy almost approaches the ultimate strength. When considered in the light of only a slight

Mr. Bernhardt, a Purdue graduate, has been with Fenn Manufacturing Co. for 12 years. He is currently a Sales Engineer there. Prior to that he was an experimental engineer at Pratt & Whitney Aircraft and a field engineer at Hartford Empire Co., a division of Emhart Manufacturing Co.

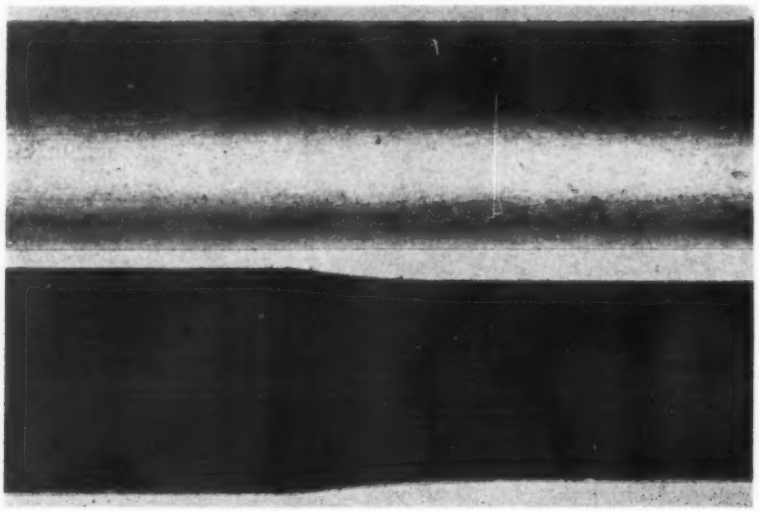


Fig. 2. A 1½X enlargement shows a sectioned steel rod after swaging. Note the smooth continuous grain flow and refinement.

increase in hardness from Rockwell B 78-81 to Rockwell B 93 it is obvious that significant results can be achieved. Again an improvement in surface finish from 60-80 rms to 20-40 rms is significant. Further, stress concentrations produced by conventional machining is eliminated.

With reference to the increase in usable strength, indicated in Figure 5, it becomes apparent

Sample Number	Material	Process	Starting Diameter	Hardness Rockwell "C"	Yield Strength (PSI)	Tensile Strength (PSI)	Finished Diameter	Hardness Rockwell "C"	Yield Strength (PSI)	Tensile Strength (PSI)	Surface Finish (RMS) Before	After
1	Low Carbon CRS	Turned	0.875	10/15	67,990	73,660	0.770	10/15	67,990	73,660	150	100
2	Low Carbon CRS	Turned	0.875	10/15	67,990	73,230	0.770	10/15	67,990	73,230	150	100
3	Low Carbon CRS	Swaged	0.875	10/15	67,990	73,660	0.770	20/25	72,650	72,650	150	15
4	Low Carbon CRS	Swaged	0.875	10/15	67,990	73,230	0.770	20/25	70,960	72,050	150	15

Fig. 3. Results of examination after swaging a 0.875" dia steel rod to 0.770" dia and comparing it with a rod.

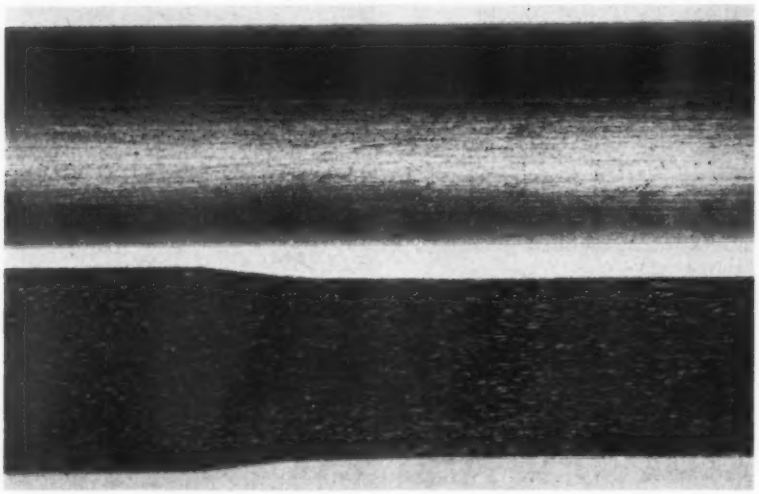


Fig. 4. A 1¼X photo of a sectioned aluminum rod after swaging. Here too there is uninterrupted grain flow and refinement.

that the load carrying capacity of a swaged smaller diameter can actually be greater than that of the larger diameter from which it was swaged. For example, the aluminum rod whose starting diameter was 0.875" had an area of 0.6 sq in at 47,800 psi or a total strength of 28,600 lbs. This rod was then swaged to 0.770", effecting a reduction in area to 0.465 sq in at 79,900 psi

Sample Number	Material	Process	Starting Diameter	Hardness Rockwell "B"	Yield Strength (PSI)	Tensile Strength (PSI)	Finished Diameter	Hardness Rockwell "B"	Yield Strength (PSI)	Tensile Strength (PSI)	Surface Finish (RMS) Before	After
1	#2024 St Aluminum	Turned	0.875	78	47,830	68,480	0.770	78	47,830	68,480	60-80	60-80
2	#2024 St Aluminum	Turned	0.875	81	49,240	69,480	0.770	81	49,240	69,480	60-80	60-80
3	#2024 St Aluminum	Swaged	0.875	78	47,830	68,480	0.770	93	79,910	82,070	60-80	20-40
4	#2024 St Aluminum	Swaged	0.875	81	49,240	69,480	0.770	93	80,450	84,670	60-80	20-40

Fig. 5. Results of examination of a 0.875" dia aluminum rod after reduction to 0.770" dia. The comparison is made with a turned rod.

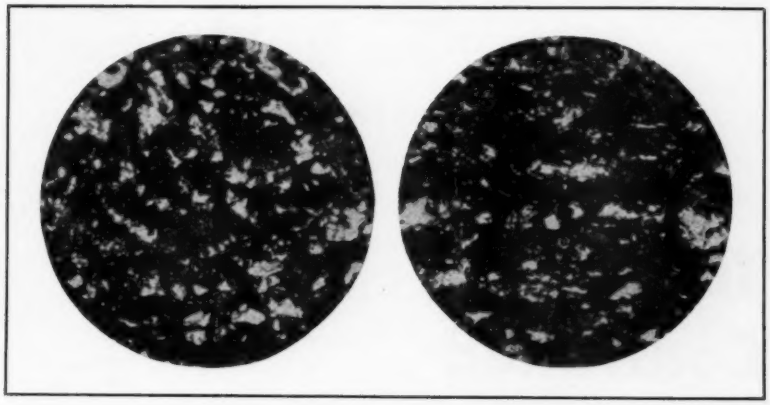


Fig. 6. Comparison photo-micrographs (200X) showing the steel rod before (left) and after (right) swaging. Note the increase in density.

or a total usable strength of 37,000 lbs.

Similarly with the low carbon rod, the starting area was 0.6 sq in at 67,990 psi or a total usable strength of 40,700 lbs. When swaged to effect a reduction in area to 0.465 sq in at 72,650 psi there is a total usable strength of 33,800 lbs. The increase in usable strength of 7.3% is accomplished; other means of reduction might have reduced the usable strength.

These tests show clearly the effect of swaging on materials whose characteristics lend themselves to work hardening and should give product designers and manufacturing engineers confidence to include swaging in their processing, where applicable.

—*W. E. H.*

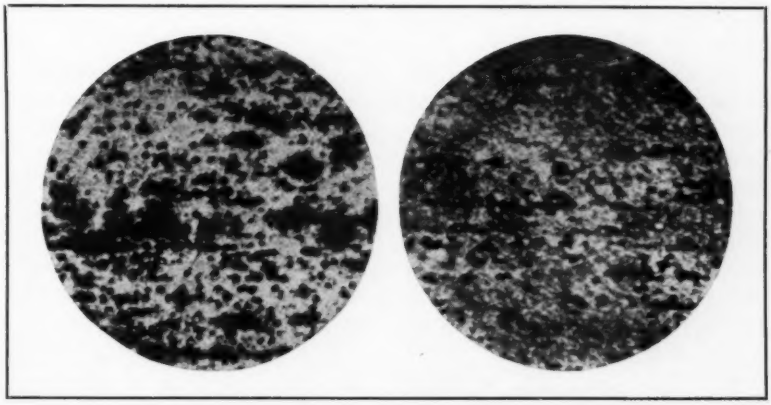


Fig. 7. Comparison photo-micrographs (400X) showing the aluminum rod before (left) and after (right) swaging. Here again the change in density is significant.

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Back-Counterboring Done from Internal Face of Crankcase

Back-counterboring from the internal face of a crankcase is possible on a machine designed and built by Zagar, Inc. The machine drills, reams, taps, and back-counterbores 21 holes in each of 9 cylinder heads. Back-counterboring is done by a special spindle (inset) which brings the tools automatically into cutting position, allowing them to be rotated in the case.

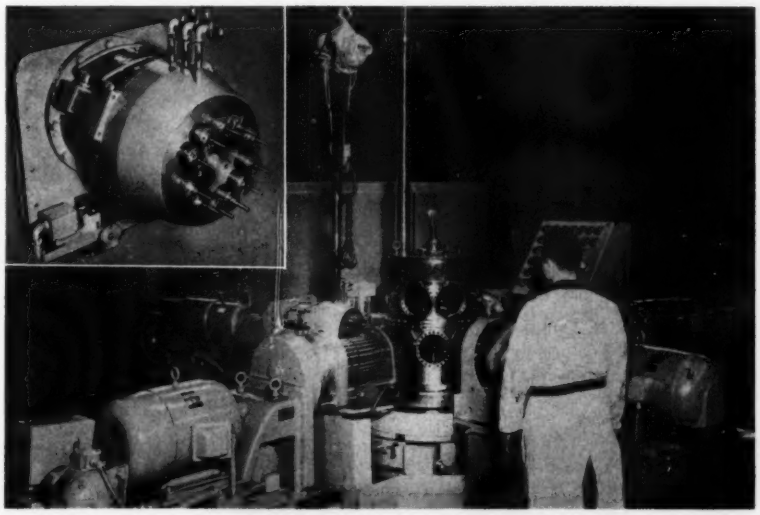

Fig. 1. Turret punch press is controlled by tape inserted into the GE console cabinet. This Type A-100 Weidematic press pierces large metal sheet at the rate of 30 hits/min.

Tape-Controlled Turret Press Speeds Piercing

WHEN A SPEEDY TURRET PUNCH PRESS is operated by tape control, existing production records are bound to fall. At General Electric's Specialty Control Department, the Weidematic tape-controlled turret punch press has done just that.

On short run piercing operations at the plant, holes of any size or shape up to 8" dia are produced in less than one fifth the time required with a manually operated turret press. The 100-ton capacity automatic press has a throat depth of 63" and can pierce sheet metal or plate up to 60" x 100" x 3/" thick at a rate of 30 hits/min.

The new press was designed by the Weidemann specifically for use with General Electric's modified Mark III numerical positioning control, which automatically directs tool selection, material positioning and piercing. This integrated machine control eliminates multiple die sets, layout, tool setup, and multiple material handling. In addition to high speed locating and piercing, the tape control provides accuracy and repeatability.

Operation of the Weidematic is reduced to pushbutton simplicity. All of the information required to complete a job is programmed on a standard eight-channel, 1" wide tape. The operator simply loads the material on the press table, inserts the tape in the tape reader, and starts the press.

The material is moved in-or-out and crosswise to the designated centerline dimension at a speed of 600 to 800 ipm, while the turrets rotate to bring the proper punch and die into piercing position in less than two seconds. As soon as all three motions are completed, the press trips.

Tape preparation is done by either a standard tape punching unit, working to a chart listing the X and Y dimensions and turret station number for each hole, or by an Auto-programmer developed by General Electric. This latter unit can produce a tape from a dimensionless line drawing using an optical system. With this method, drafting time can be reduced 75%.

Substantial savings in tooling costs are possible since only one punch and die of a size are required, regardless of the number of openings. Large rectangular openings can be made by a series of hits with a single tool. All tools normally required are in the turret ready for use; up to 36 tools can be mounted.

Automatic workholders (Fig. 2), sensitive to signals generated by proximity pick-ups, are used to permit punching close to the edge of the sheet without interrupting the machine cycle for manual relocation of clamps. When the pick-up head registers with a profile cam located front of the turrets, the workholder jaws open and the clamp is retracted. Conversely, when the head moves away from the cam the workholder returns and reclamps the sheet. end

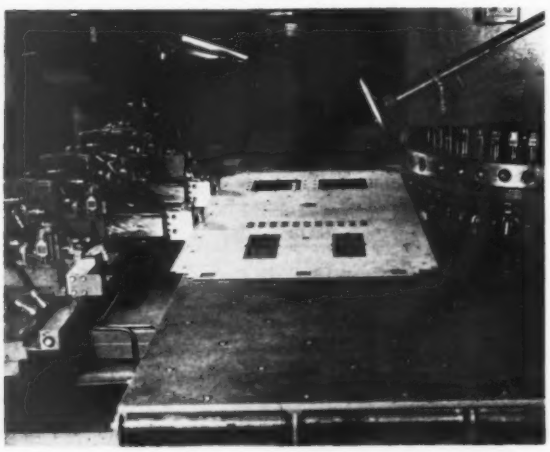

Fig. 2. Large sheet is secured by two workholders while other two clamps are in withdrawn position to allow punching close to edge of sheet.

Machined Nylon Tubing

Doubles Expansion Arbor Range

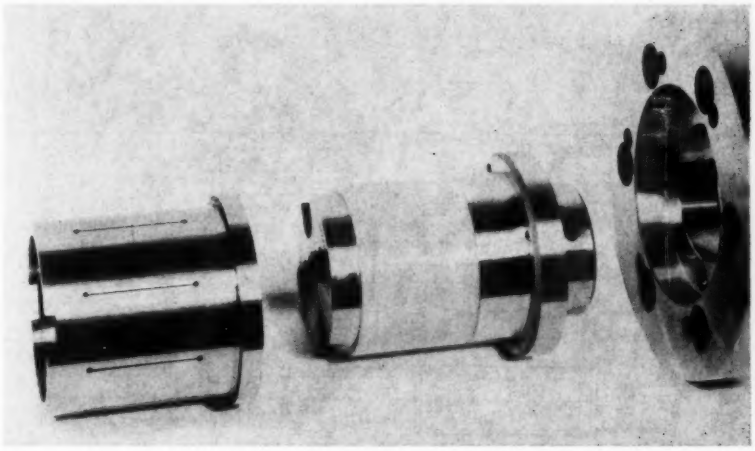

Fig. 1. Production costs are held to a minimum by machining the nylon sleeve from Polypenco-nylon tubing. The 5" OD x 4⅜" ID tubing cost is less than half that of solid nylon bar stock of the same OD. The tubing requires only light finishing cuts, while making the sleeve from solid bar stock would waste 85% of the material plus the machining time to remove it.

A TOOL REDESIGN PROJECT at the A & C Engineering Co., Warren, Michigan, resulted in a greater range of expansion for their hydraulic expansion arbors and chucks. The major parts in the redesign are pressure expansion sleeves machined from Polypenco-nylon tubular stock.

Designers more than doubled the previous expansion range by using nylon sleeves as pressure bags or pressure containers. Unsupported nylon does not hold the extreme tolerances in machining that are required for the arbors and nylon would also stretch and not recover adequately under the high pressures. They solved this problem by surrounding the nylon expansion sleeve with a split steel outer arbor.

Substantial savings result from the use of nylon tubing manufactured by The Polymer Corporation, Reading, Pa. Properties of the tubular stock are the same as nylon rod but material costs for tubing, in the sizes used by A & C, are less than half that of nylon rod. In addition, the great percentage of the nylon bar would be wasted. A typical nylon sleeve, Figure 1, would require several extra machining operations to hog out 85% of the material before attaining the size of the Polypenco tubing—

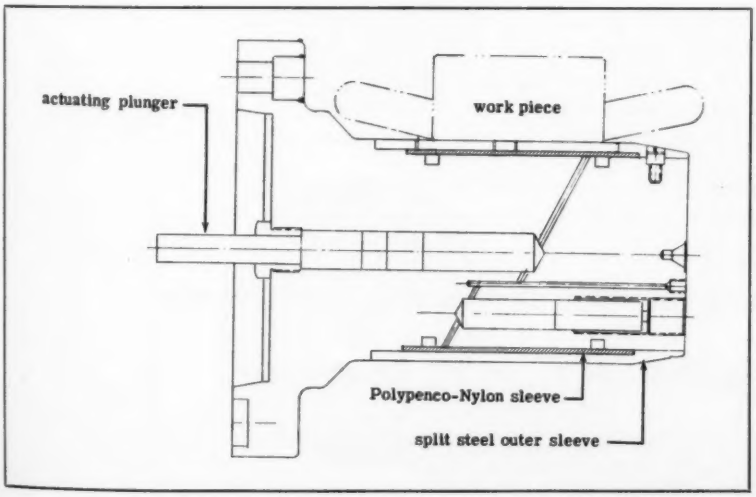

Fig. 2. Hydraulic pressure applied by the actuating plunger expands the nylon sleeve against the split steel outer arbor. This method more than doubles the expansion range of A & C Engineering's chucks and arbors. Previously, with solid steel outer arbors, expansion was limited to 0.003" per inch of arbor diameter. Using the nylon sleeve as an hydraulic pressure container and slitting the steel outer sleeve allows 0.007" to 0.008" expansion per inch of arbor diameter without sacrificing accuracy.

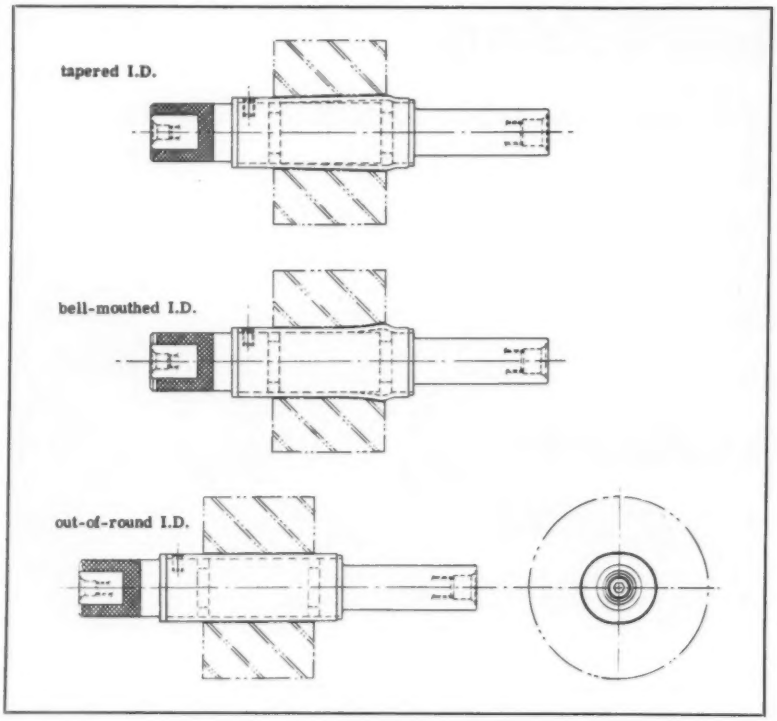

Fig. 3. Increased expansion enables the chucks and arbors to conform to greater variation in the workpieces. The hydraulically expanded arbors establish the true centerline of the part for inspection or additional machining operations even though the locating surface be tapered, bell-mouthed, or out-of-round.

5" OD x 4⅝" ID. By using tubing, only light finishing cuts are required to attain the final diameters.

The finished nylon sleeves are used as a bladder or diaphragm to transmit hydraulic pressure to a split sleeve steel arbor similar in design to the original metal sleeves except for small longitudinal slits inserted around the sleeve. Depending on the arrangement of the slits in the steel outer sleeve, as much as 0.007" to 0.008" expansion is obtainable per inch of arbor diameter. Limitations on arbors made with solid steel are 0.003" expansion per inch of arbor diameter. In many applications, more expansion is desirable to enable faster loading and unloading and to allow for greater variation in workpieces.

Expansion in the patented arbor is hydraulically controlled. By moving the piston forward, hydraulic fluid is forced from the piston chamber into the area between the arbor body and the expanding sleeve, as shown in Figure 2. This force, measured in thousands of pounds per square inch, stretches the sleeve outward with controlled accuracy.

This technique permits positive internal and external location for inspection or machining even though the locating surface, itself, may not be true or within the tolerance required. The expanding sleeve conforms to the contour of the locating surface as shown in Figure 3. Whether the ID is tapered, bell-mouthed or out-of-round, the hydraulically expanded arbor fills the hole and locates the true center line of the part. This enables further machining of the part with dimensions accurately located from the true center of rotation. By conforming to the shape of the part, the arbor bears on the entire surface and produces maximum holding power.

Pressures used with nylon sleeve arbors are extremely high — 20 to 30,000 psi. Some special applications have been much higher. Accuracy of location is within 0.0001" concentricity. The same principle is used for both chucking and arbors. When a chucking operation is required, the hydraulic pressure is applied to the OD of the nylon sleeve and pressure is exerted inward onto a steel sleeve.

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Short Run Identification Plates

by L. G. Harrison

SMALL QUANTITIES OF A SPECIAL identification plate are occasionally needed for certain jobs. The quantity may be three, five, or possibly eight, but still only a small number. The need may be for an identification plate that is used only periodically — 12, 15, or 20 a year.

Ordering plates in small lots, however, is not economical. A review of purchasing records for three simple rectangular plates reveals the costs shown in Figure 1.

Fig. 1. Cost of plates procured from nameplate manufacturer shows that it is not economical to buy them in small lots.

The procurement of a surplus quantity in order to obtain a good price break brings about another area for consideration — stocking. Can the price break realized in obtaining a surplus quantity be justified if the surplus must be stocked for extended periods of time? It costs a company a great deal of money to have slow moving stock sitting on shelves.

Link Aviation, Inc. was faced with this problem. We needed identification plates for spare orders on old assembly units. These units were never ordered in sufficient quantities to warrant stocking the necessary identification plates.

We attach a patent plate to our major products (flight simulators, computers, and precision testing equipment). The patent plate is reviewed three to five weeks prior to delivery of the equipment. This review determines if the patent plate is up-to-date with the latest patent numbers.

A policy such as this assures us of being current with our patents. It also makes it impossible to carry quantities of the patent plate in stock. This three to five

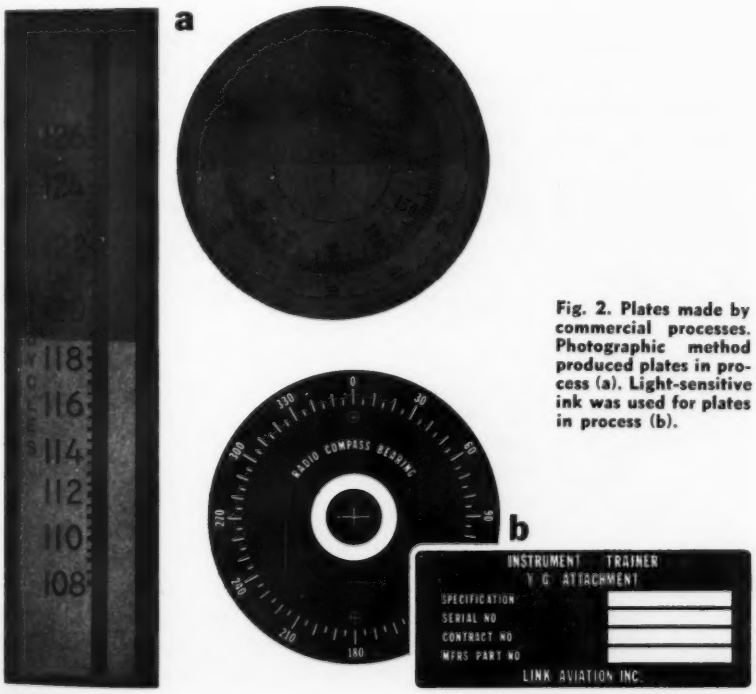

Fig. 2. Plates made by commercial processes. Photographic method produced plates in process (a). Light-sensitive ink was used for plates in process (b).

Mr. Harrison is Supervisor, Standards Publications Department, Link Aviation, Inc., Binghamton, New York.

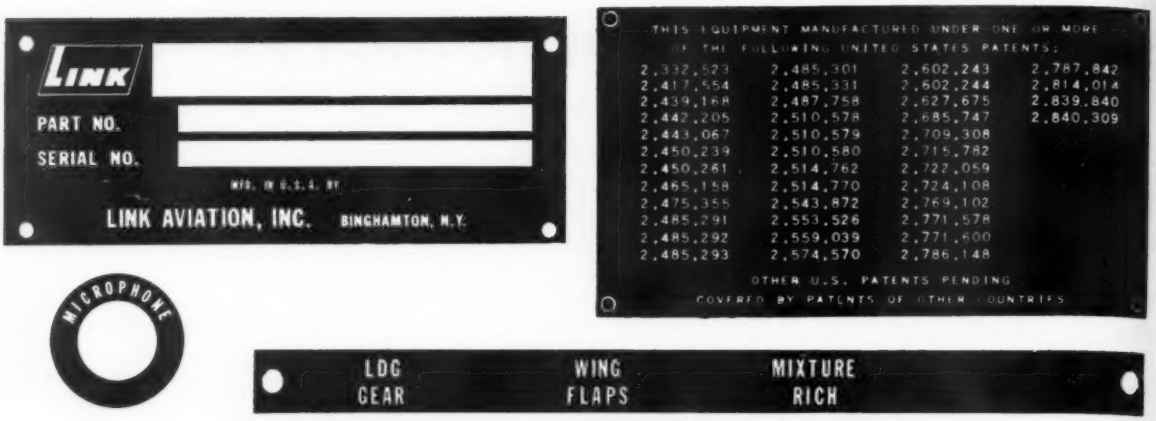

Fig. 3. Link developed its own process for making these identification plates for aviation products.

week review period makes it impossible to order a patent plate even if we were willing to pay the premium price.

Commercial Processes

Approximately one and one-half years ago, the Standards Department in conjunction with Tool Design started to investigate the fabrication of identification plates for small quantity requirements. The study started with two existing commercial processes.

One involved a permanent photographic reproduction on clear anodized aluminum plates, which are supplied to the user. Processing of plates can be done in any company photo department or by any local photo agency.

Chemicals used in this process are readily available at photo supply dealers. The normal process results in black images on the aluminum background. A supplementary staining will provide color combinations of black and red, green, or gold. Figure 2(a) illustrates plates made by this process.

Another commercial method uses a metal plate coated with a light-sensitive ink. All processing materials are supplied to the user. The metal plate is anodized in many standard colors with a glossy or dull finish. Processing is quite simple and can be done without special equipment.

Steps in the process are:

1. Expose the light - sensitive plate through the use of a film negative or film positive and a photo flood lamp.
2. Insert in hardener solution and wash.
3. Insert in etch solution and wash.
4. Remove ink. (This is an optional step.)

This process produces an etched plate, the etch being roughly 0.0005" deep. Figure 2(b) illustrates plates made with this process.

Do It Yourself

Investigation of commercial methods indicated what could be done to supply a small quantity of identification plates. We then decided to go one step further and prepare the sensitized metal ourselves, so we could control the color as well as produce the prepared metal at less cost.

Many problems had to be solved before we could succeed. Proper adhesion of the photo resist was our first problem. This phase was discussed with photo-engraving representatives and the problem resolved. We determined the best etchant by consulting etchers and by trial and error.

After solving the major problems, this process was adopted:

1. Preparation of Metal — The material selected for best results is 5052 (52S) half hard aluminum. Thickness is determined by past identification plate requirements. The size of sheet is determined by the operation procedure.

The aluminum is color anodized to the desired color. Color anodizing serves as a bond for the Kodak Photo Resist (KPR), and it also gives the desired color of the end product. A dull color anodize is obtained by a light sand blasting or etching prior to anodizing.

The anodized aluminum is then treated with KPR, applied according to manufacturer's instructions. The aluminum is then whirled under an infrared heat source so the KPR properly adheres to it. The heat was omitted in early tests and the KPR was not stable in the etch solutions.

The treated aluminum is now light sensitive, comparable to photographic film.

2. Art work — As with anything of a photographic nature, a negative is needed to make a positive. This process uses a film negative or a film positive, depending upon the desired end result. The art work and negative may be prepared in any manner. The final film negative or positive must be to the exact scale of the identification plate.

To determine whether a film negative or a film positive is required it is necessary to keep in mind that light going through the clear areas of the film will cause the sensitive plate to remain as it is — a color anodize. The unexposed area will be etched away.

3. Identification plate — The film negative is placed against the treated surface of the metal and exposed to light per instructions relative to the KPR. The plate is placed in the KPR developing solution to set the resist solution. After developing, the plate may be placed in a dye solution to color the area which will not be etched.

The exposed metal is then placed in an etchant and the unexposed area etched away. This results in an anodized identification plate with plain aluminum etch areas. The KPR that protects the anodized area is removed by wiping the plate with KPR thinner.

4. Finishing the plate — The plate can now be trimmed to the desired size. This can be done on a small foot shear, or if the material is a foil or thin metal, on a heavy duty paper cutter.

A solvent activated adhesive can be applied to the back side of foil or thin material and allowed to dry. The adhesive may be activated at any time by a good solvent, such as carbon tetrachloride, trichloroethyne, lacquer thinner, or acetone.

Plates made by the above process are shown in Figure 3.

Improvements Found

The process described has been improved upon as a result of recent experiments at Link. We now use an enamel-etch process to produce our patent plates.

In this process the 5052 half hard aluminum is clear anodized as a bond for the KPR. The plate is coated with KPR, exposed to light, and etched to a depth of 0.003″ to 0.005″. A thin coat of a good thermosetting enamel is sprayed on the plate to color it.

The plate is baked at approximately 300°F for five min. It is then sanded with a fine sandpaper to remove the enamel from the high spots. Any marring of the enamel in the etched areas will clear itself in the baking sequence. The plate is then baked according to the enamel manufacturer's requirements.

Results of our experimental work will permit us to make our patent plate to match current identification plates at a reasonable cost.

The processes described are also ideal for labels, dials, scales, schematic labels, and diagrams. An individual's experience and imagination will bring to mind many other possibilities.

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Fans Made from 'Scrap' Steel

Scrap steel, remaining after holes are punched in the casings of space heaters for the placement of fans, is being utilized to cut costs at Reznor Manufacturing Co. The company is using the circular steel pieces, formerly discarded, to fabricate a one-piece four-bladed propeller fan. Made from Jones & Laughlin's 20 ga commercial quality cold rolled sheet, the steel blades cost less and function as efficiently as the aluminum fan blades the company previously purchased from outside suppliers.

The hole punched in the case varies in size from 12″ to 18″ dia, depending on the size of the space heater casing. Fabrication of the steel blade from the blank is relatively simple. The fan blade is blanked in one operation. The hub, a screw machine product, is then riveted to it. Next, each blade is set precisely at proper pitch, and then electronically balanced.

High Speed Threading With Carbides

A METHOD FOR ACCURATE high speed threading with carbide tools is gaining popularity in this country and in Europe. Lathes with automatic, cam controlled slide movements and an arrangement for maximum rigidity of the supporting saddle are the main features of this Cri-Dan technique.

In developing the method, basic requirements of a threading cycle were considered. This cycle can be represented schematically by a rectangle, with one of the large sides representing the cutting stroke and the other large side, the return stroke. The smaller sides represent the recoil at the end of the cutting stroke, and the penetration into the workpiece. Depth of thread is obtained by a repetition of this basic cycle. The same cutting pass is performed each time with increasing depth, until the desired depth of thread has been obtained.

Lead is obtained by the ratio established between the spindle speed and the longitudinal feed of the slides. Each revolution of the spindle corresponds to a longitudinal feed of the tool.

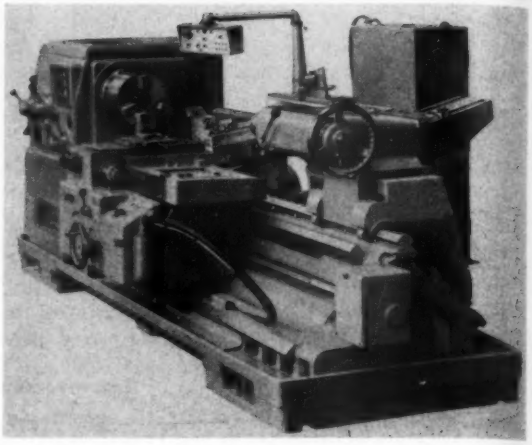


Fig. 1. High speed threading and tracing are done in a single operation on this automatically-cycled Cri-Dan unit.

Fig. 2. Threading tools and other carbide form tools are profiled by lapping on Cri-Dan's Profilap machine.

These well known requirements presented problems in designing a technique for high speed threading. Since the high cutting speeds necessary for carbide tools lead to movements of slides in the same speed ratios, a machine must be capable of operating at a rate up to 120 passes/min. This is true even when a thread terminates in a groove or against a shoulder.

Machine Design

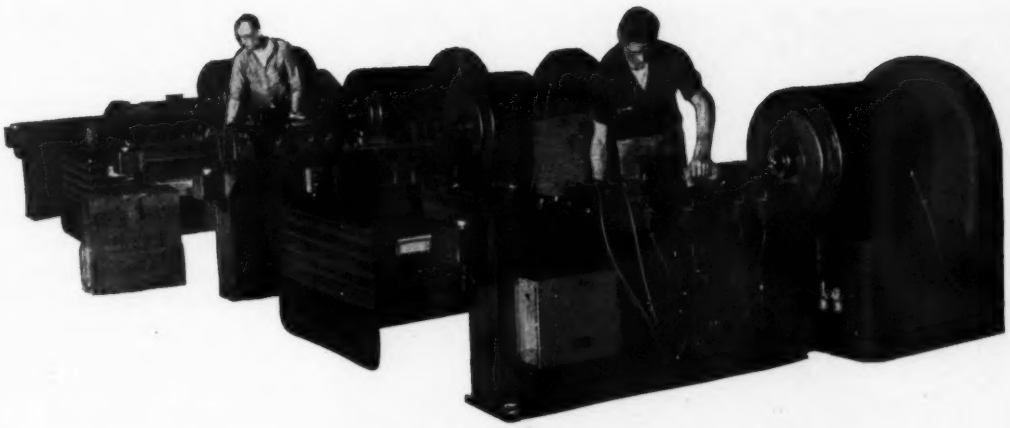
In order to handle such high operating speeds, the machines were designed so that movements of the slides would be automatic and cam controlled. This permits the accelerations and decelerations to be controlled as desired, by eliminating reversals and shocks which are incompatible with accurate high speed operation.

The supporting saddle on the Cri-Dan units is moved along the bed only to position the tool in relation to the part to be threaded. The saddle is then clamped in this position during the threading operation. Threading is performed from a longitudinal and a cross-slide mounted on the saddle. The patented arrangement enables the saddle to be built to the desired rigidity and the threading slides to be built to maximum dimensions, in keeping with the functions they are to perform.

New Machines

Since the initial success of the technique in Europe, new multi-operation lathes equipped with accessories for tracing, facing, chamfering, and turning have been developed. They use a patented mechanical arrangement which can be adjusted simply to automatically produce any pitch in any number of passes required.

The "FT 80" machine (Fig. 1) introduced at this year's European Machine Tool Show is the newest in the line. It combines the advantages of an automatic cycle tracing lathe and a threading machine. Featuring a double bed for semi- or fully-automatic threading and tracing in one operation, the machine is specially suited for medium and heavy production on precision tubing and fittings. In the United States, Gisholt Machine Company is licensed to produce this unit and others of the line. end



Long Taper Swaging

by E. F. Abbey

SWAGING LONG TAPERS, as compared to other methods of producing these shapes, means producing at a higher rate, and increased profits. This is due to the speed of the process and the fact that less skill is demanded of an operator. Not only can the work be done with cheaper labor, but each man can handle more than one machine. Also, while speaking of saving on labor, it should be mentioned that the setup of a swager is simple —it doesn't usually require a setup man.

Another big advantage is quality finish. Components used in automotive, furniture, appliance, medical instruments, and other industries where appearance is a big factor, demand this quality. More than not the swaged finish is such that further attention is not necessary.

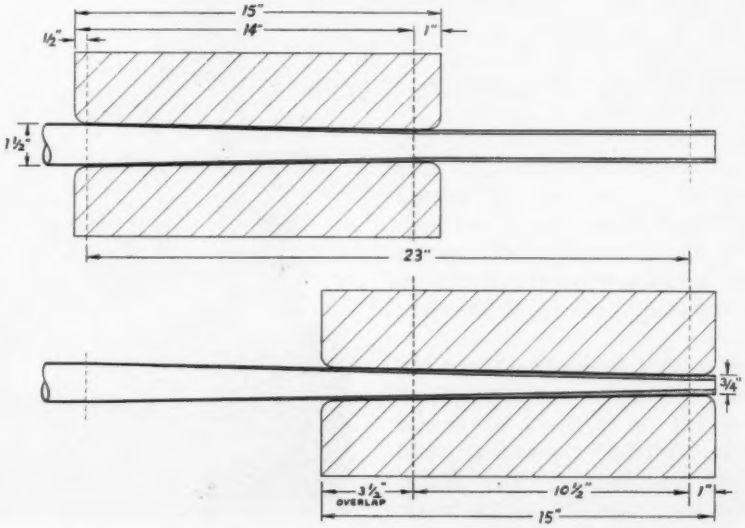
With the rapid increase in the building of new schools, homes, and office buildings there has been an expanding market for metal furniture and office furnishings. In this area, the long taper has practically revolutionized the concept of metal stands and furniture legs. This development was long overdue since hand-wrought metal, and woodworking, and earlier production methods were not economical. Not only that; an increase in volume became an absolute necessity and from this came, along with quality, a broader use of swagers. In turn, metal furniture came to be useful in other parts of the home besides in the kitchen and on the patio.

The two-die method is preferred in swaging long tapers since initial equipment costs are less and the dies can be easily matched — the better the match the better the finish.

While a long taper as one operation on a heavy machine is not an astounding feat, it becomes more interesting when the same job is done on a lighter machine. This points up versatil-

Mr. Abbey is a Vice President of the Abbey-Etna Machine Co., Toledo, Ohio.

Fig. 1. Cross-section of a long "swaging" showing die relationship when done in two operations. Notice the overlap for blending. Notice also the thickening of the tube wall, for strength increase.



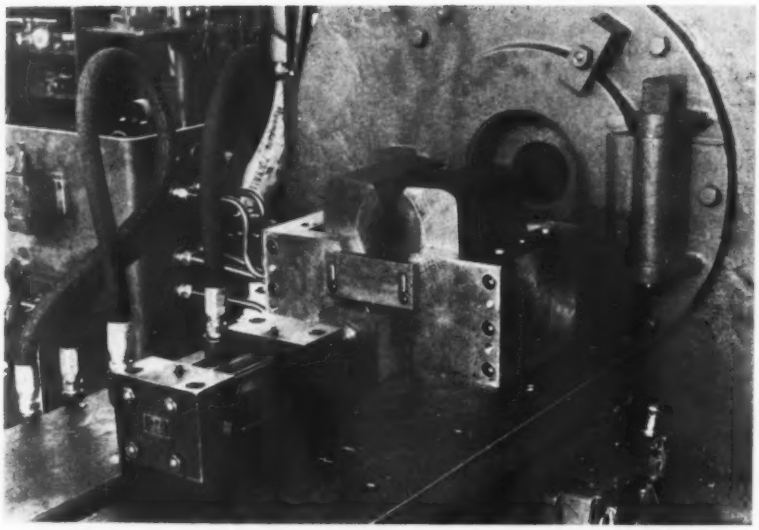


Fig. 2. A manually loaded hydraulic feed fixture. Airdraulic feeds can also be used, as well as completely automatic magazine feeds.

ity and the opportunity to save money where this versatility is applied. A machine capable of doing the job in one operation, shown in Figure 1, would in itself be expensive, require expensive dies, and great power. However, this 23″ swaging can be accomplished on a smaller machine, using 15″ dies and two operations. It will be of interest to know that this job is done with a 10-hp a-c motor that provides 200 rpm at the spindle.

A good rule of thumb! Tapers longer that 18″ are most economically performed with multiple operations. Although when swaging with more than one operation the second swaging operation must be carefully done so the blending of tapers is undetected. In this instance the first operation reduces the first half of a taper and the second operation forms the second half. The taper cut into the second die contains an overlap to assure a smooth blending of the two areas.

The dies in Figure 1 are 18″ long, 3″ wide, and 1⅝″ thick and can be made of steels like Zivco, PRK-33 Cobaltcrom, and Neor, to mention only three. Hammers are 2⅜″ thick made from the same material. The 16 rolls, fitted without a cage for a maximum number of blows, are made of a water quenched tool steel such as SAE 52100.

The basic simplicity of the swaging operation is such that automation, or near-automation, is easily had by automatic feeding. For straight full length reductions on bars or tubes, roll feeds at the entrance and/or exit end of the swager can make it fully automated by passing the work completely through the spindle, whereas in pointing, forming, or assembling, the work is inserted and withdrawn from the front of the machine. Often this is accomplished by hand feeding, but with the use of an airdraulic or hydraulic feed (Fig. 2) a greater uniformity is attained and a more constant production rate acquired.

A straight hydraulic feed is used for heavy operations, and operates automatically to consecutively clamp the work, advance rapidly, slow to the proper feed, dwell momentarily and then return rapidly, and unclamp. An airdraulic feed accomplishes the same results, but on lighter operations.

Airdraulic is a combination pneumatic and hydraulic arrangement in which a pneumatic cylinder supplies the power while a hydraulic chamber transmits it smoothly. The airdraulic unit is less expensive.

For fully automated operations, handling devices are available to index, insert, withdraw and eject work, requiring only one operator attending a battery of swagers.

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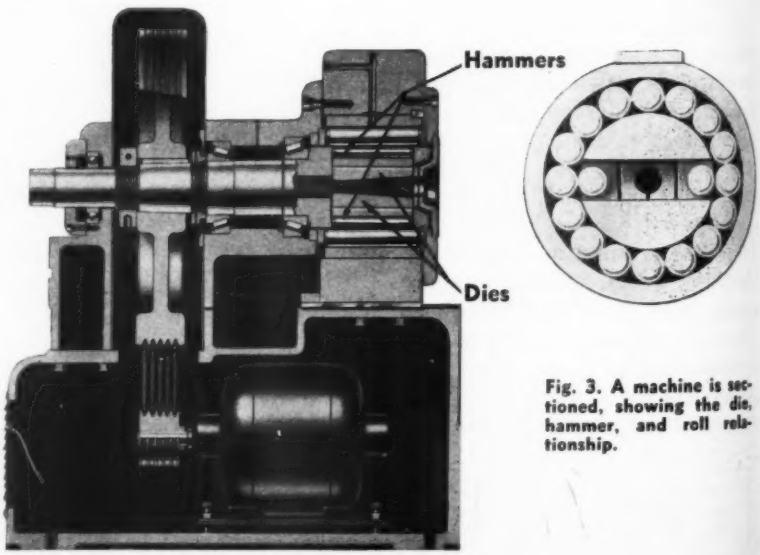


Fig. 3. A machine is sectioned, showing the die, hammer, and roll relationship.

Planned Use of

Reusable Magnetic Tooling

. . . for productivity and profit

by D. E. Dutt

and J. M. Loidl

EVEN A GOOD tooling system will be successful only if it is organized to utilize its productivity capabilities to the fullest extent. The real success of the Whistler* Magnetic Perforating Die at General Electric's Air Conditioning Department can be attributed to two factors: The method of storing and cataloging die components, and the method of designing template layouts.

This plant manufactures gas and oil fired hot air furnaces. Virtually all dies used prior to 1953 in this operation were the conventional Class A type dies. Total production requirements from this tooling would be as high as 350,000 sheet metal parts; but there were instances where only 10,000 to 20,000 parts would be produced from this tooling.

In addition to this wide variation in production quantities, the nature of the business requires as many as three setups per month for some of the parts, to permit an optimum material turn-over rate. In instances where a particular part design would go unchanged for a five year period, it could be scheduled for as many as 180 setups.

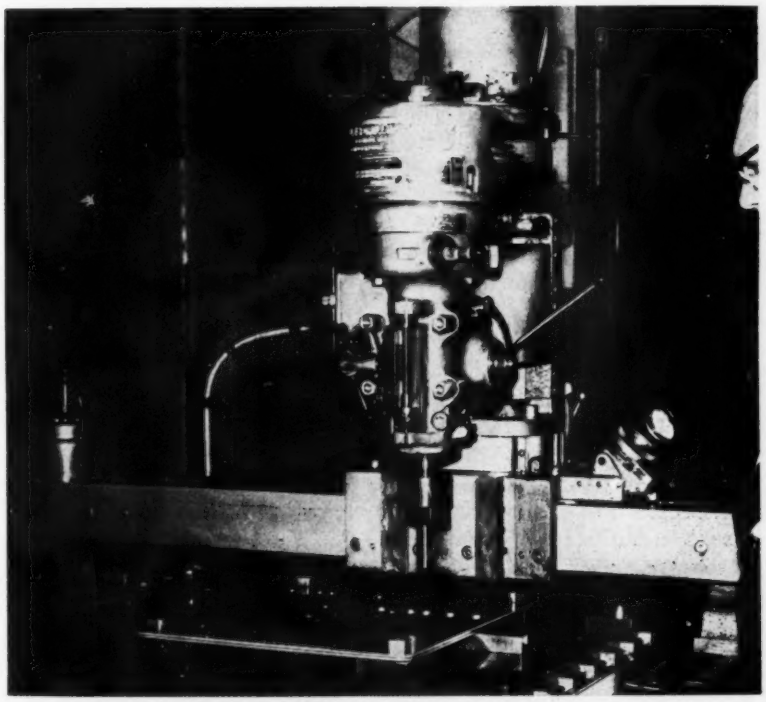


Fig. 1. Setup for precision boring the hole pattern in the templates for the punch and die retainers. Note that both templates (upper and lower) are sandwiched together and placed on locating posts similar to those which locate the templates in the die shoe.

The company evaluated the magnetic perforating dies, and found their operation to be ideal for this low cost, quick set up, reusable type tooling.

Die parts identification and systematic cataloging is vital in this system. Other plants have a very ineffective Whistler system because parts and components accumulate and lose their identity, while the users are

Mr. Dutt is a Senior Engineer in the General Electric's Tool Development Service Manufacturing Laboratory in Schenectady, N.Y. Mr. Loidl is a Manufacturing Engineer in the company's Trenton, N.J., Air Conditioning Dept., where the work described in this article is done.

**These dies are made by S. B. Whistler & Sons, Inc., Buffalo 23, N.Y. For descriptive material on them, circle Inform-A-Gram No. D-1.*

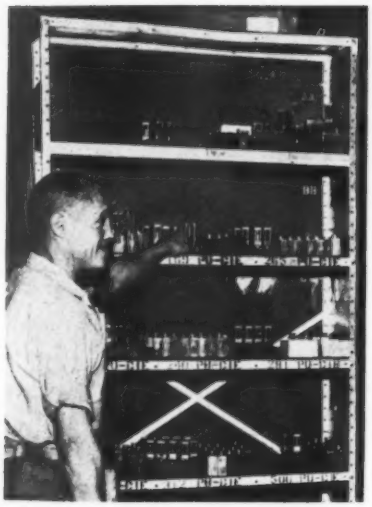


Fig. 2. All die components and accessories are stored in bins identified to tie in with an effective cataloging system.

frustrated to the point where the whole system is condemned. The first step in the G.E. reusable die program, therefore, was to set up an effective cataloging system so that all retainers, strippers, punches, die buttons, etc., could be selected quickly and easily.

To make the tooling system most effective, it was decided that a Whistler layout draftsman should be located in the Engineering Design Section. This contributed to standardization, since new designs and design changes being contemplated by engineers can be integrated, to a large degree, into existing tools by close communication between the engineers and Whistler die layout personnel.

All magnetic die assembly is done in a special area. Within a step or two of the assembly table is a complete "library" of templates as well as clearly marked bins of the various die components. All non-durable items such as punches and die buttons are stocked in this area and minimum order points are established to insure a perpetual inventory.

In many instances there are specific close hole patterns or irregular-shaped cutouts which are common to many furnace designs. Although tools for these operations would normally be considered as "specials," Trenton stocks these punch and die combinations along with their standard tools and are able to use them over and over again.

A Wales Strippit* template boring machine is used to precision bore the required hole pattern in the templates for the punch and die retainers. Both templates are sandwiched together and placed on locating posts similar to those which are used in the die shoe. Accuracy of this machine permits holding center distance between holes as close as 0.001" in a 45" length.

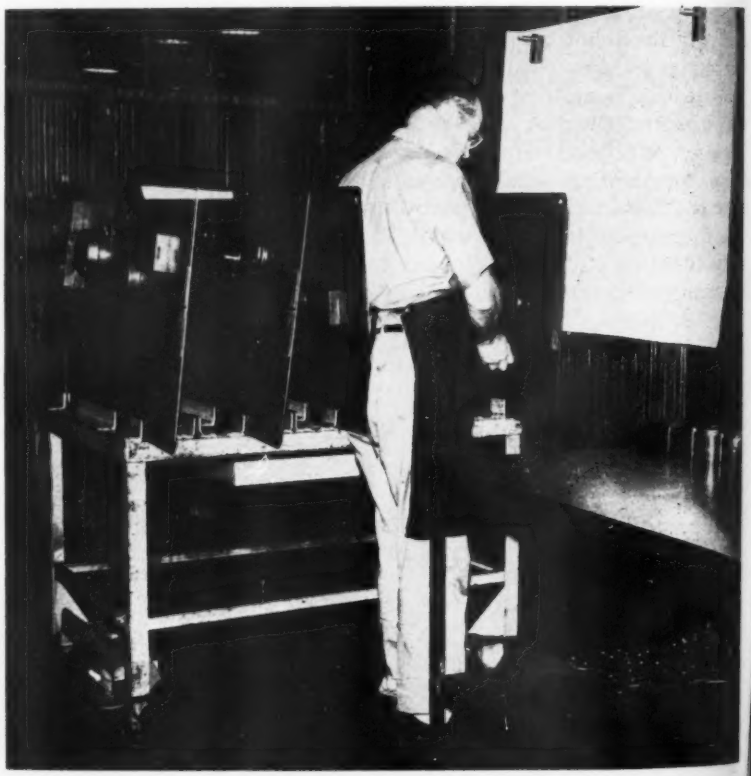
A review of the common sheet metal workpiece sizes indicated that three different template sizes would cover most of the requirements. By combining as many as three templates in one die shoe, dies for even the largest parts can be easily and quickly assembled.

The Trenton plant has been able to include up to four individual hole patterns in each template for four different parts. This technique helps reduce the template storage area and also the overall template cost.

Tight hole spacing sometimes makes it impossible to assemble die components close enough to pierce all the holes in one template setup. To eliminate the necessity of two or three individual press runs to complete parts in this category, progressive setups are sometimes made so that a finished part is produced with each machine stroke.

Die changes involving size reduction of a hole on conventional dies can be very expensive. By laying a weld bead around the

Fig. 3. With a layout sheet before him, the magnetic die assembler mounts the components on the template. In this instance, two upper and two lower template assemblies are being made for a medium size sheet metal part. Table at right has a brass top for the magnetic punch retainers.



**For descriptive material on this Wales-Strippit template boring machine, circle Inform-A-Gram No. D2.*

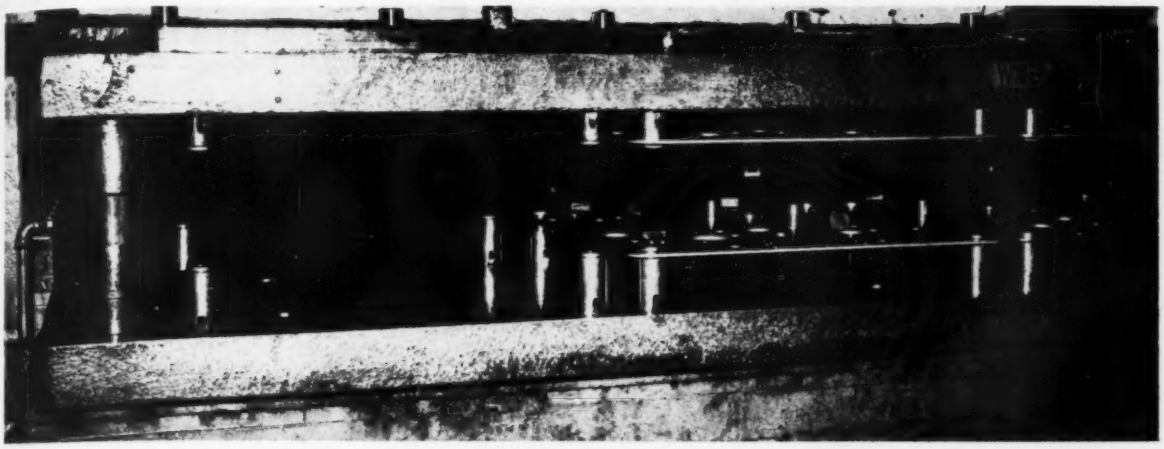


Fig. 4. The universal die shoe always remains in the press so actual downtime is only a matter of minutes. This die shoe has three sets of posts to accompany three templates at one time, but only two templates are being used in this setup.

circumference of a hole bored in a Whistler template, a new hole can be rebored quickly and easily.

After the templates have been bored, they are delivered to the special area where all magnetic die assembly is performed. Two men are permanently assigned to this work area, spending approximately 8 hrs a day each, mounting and dismounting templates as well as setting the finished assembled templates in the press and obtaining a first piece inspection. They keep nine presses in operation, which often requires as many as 15 to 20 individual setups per day.

After all components have been assembled to the template, they are quickly and easily delivered to the press department on a caster equipped assembly cart.

Since the universal die shoe always remains in the press, the actual press downtime is only a matter of minutes. Within 15 min of completion of one press run, the die setup can be removed and a new template assembly installed.

When the die has been set up and a first piece successfully run, the press operator takes over. In most instances, the same production time can be maintained on this type die as with a conventional Class A die.

Since the initial Whistler tooling was obtained, the Trenton plant has expanded their use of magnetic dies to a point where their "stock" investment in magnetic die equipment now stands at roughly $300,000. From this investment in reusable type dies they have been able to tool-up approximately 1500 operations, at an average tool cost of $200 each. In many cases, these parts measure over 3′ x 5′.

The Whistler reusable die system, as it is operated at Trenton, has enabled the plant to improve its overall manufacturing position by realizing substantial savings over conventional dies, reducing machine downtime for set up, and increasing tool utilization. It's an example of how a plant can improve productivity by throwing away the book of habit and approaching die technology in a different, improved manner.

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Fig. 5. Templates for the Whistler magnetic perforating dies are stored and readily accessible in this template library. Try to visualize the size area that would be required to store a comparable number of conventional type dies.

Throwaway-Tipped Core Drills Successful on Hard Alloy

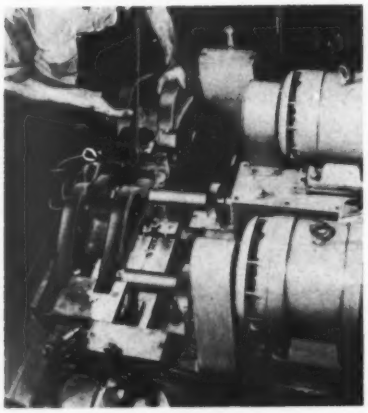


Fig. 1. Throwaway-tipped core drills mounted in 2-spindle horizontal machine. The operator loads idle fixture on 2-position table during machining.

WEB WILSON OIL TOOLS, Inc., an oil well equipment manufacturer in Gardena, California, has cut the machining time on drill pipe tong parts from 25 min to 3 min by using Wetmore gun type core drills with throwaway inserts on a special 2-spindle horizontal, 2-position machine. The drill pipe tongs are heat treated manganese-molybdenum steel of 302 Bhn.

The operation consists of machining four holes, 1¾" dia by 1½" long, in each part. The machine, designed and built by Web Wilson, is equipped with a rapid traverse table that has two hydraulic clamping fixtures, permitting loading and unloading while a part is being machined in the work position. Feeds are actuated hydraulically. Hole diameters are held to 0.0005" while the tools remove ⅛" of metal in one pass from a rough cored hole in this cast part.

The special gun type core drills, designed and made by Wetmore Tool & Engineering Co., have single ½" square throwaway carbide tips, held in place by a clamp and socket head screw. The tips can be reset rapidly at the machine to provide eight fresh cutting edges, eliminating the expense of tool changing and reconditioning.

The precision ground tips are held in precision seats so resetting to renew the cutting edge requires no adjustment, nor use of an indicator to bring the cutting tip to required gage. Two replaceable carbide backup riders inserted in the tool body guide the tool so it machines a straight, accurate hole of superior finish.

The core drill body has a collar and channels to deliver coolant from the machine spindle glands to the cutter tips.

Formerly this job at Web Wilson took two operations, drilling and reaming, on a vertical drill press. The high speed steel drills made 10 holes between sharpenings; the reamers, 30 holes. The core drills machine 112 holes with one square carbide insert before replacement of the insert. Although the hole is opened up in one pass with the core drills, both accuracy and finish have been improved as compared to the reamed hole. A speed of 250 sfpm at 0.0015 ipr feed is used with the core drills.

Production men at Web Wilson say that aside from the substantial production advantage of Wetmore core drills, their cost is less than the drills and reamers normally used, and they have more confidence in machining to the required diameter with the core drills because they are designed to machine consistently one diameter without reconditioning the tool. As a result of the unusual degree of success of these tools at Web Wilson, they are expanding their use to general purpose work on radial drills. end

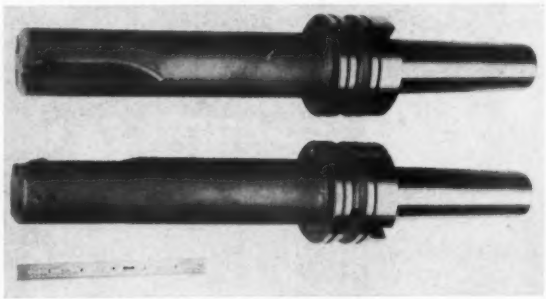


Fig. 2. Core drills are equipped with precision ground square carbide throwaway tips which provide eight fresh cutting edges that can be renewed quickly at the machine.

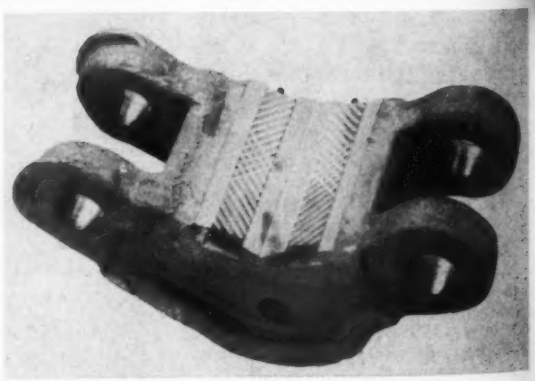
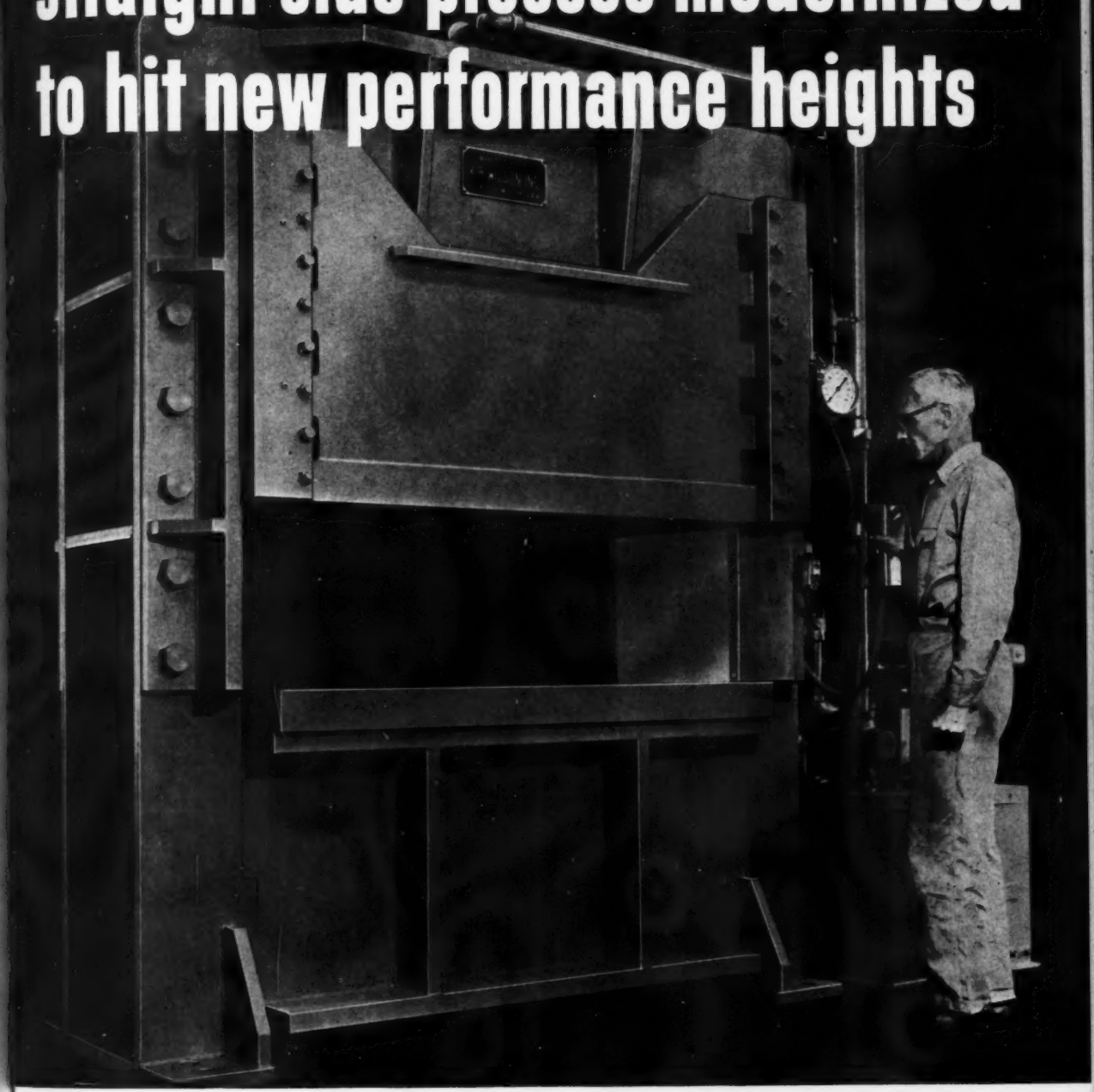


Fig. 3. Four rough holes in drill pipe tong jaws are finish machined in same setting and in a single pass to 1¾" dia with two Wetmore gun type core drills.

straight side presses modernized to hit new performance heights



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Available with either up-acting or down-acting platens, KRW Straight Side, Single Action Presses can be outfitted with manual lever or electric push buttons for single or continuous cycling. Compact, easy-to-adjust and fully responsive, KRW hydraulic systems assure instant, complete press control.

More detailed information (including specs) can be obtained by writing for illustrated Bulletin 5-B. K. R. Wilson, Inc., 218 Main St., Arcade, N. Y.

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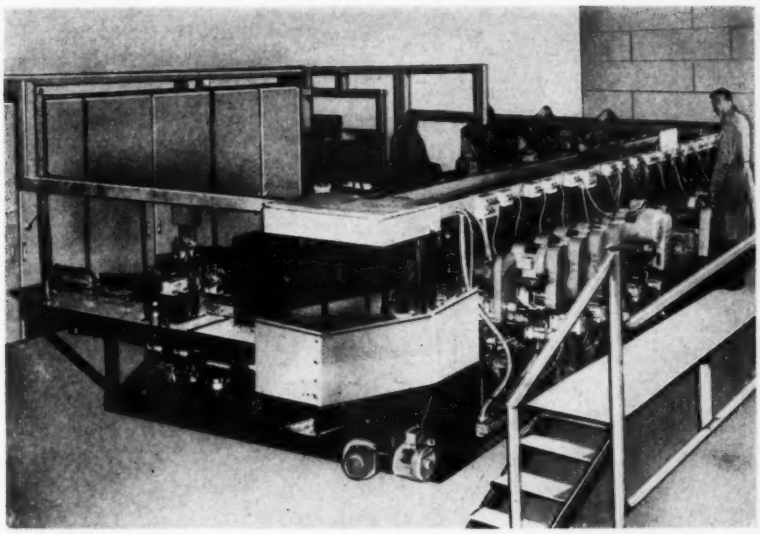

Economics Outweigh Automation Cost for DeVilbiss . . . why not for you?

The DeVilbiss Company has been making quality products for as long as we can remember — or longer. When they switch from their usual manufacturing methods to a new one (for them), it's worth a look.

ALL COMPANIES, large or small, raise the same questions when confronted with capital expenditures: What are the advantages? Will they outweigh the cost? And, can future expansion make use of the equipment? The impact of these questions is great when asked on the "threshold" of automation.

To increase production, the alternative in most cases is to maintain "status quo" by retooling or augmenting present production equipment with more of the same. This may be satisfactory in certain instances; but over the long pull, where each product fluctuation requires tooling changes, fixture changes, and additional floor space, it can be expensive.

To meet the demand for their

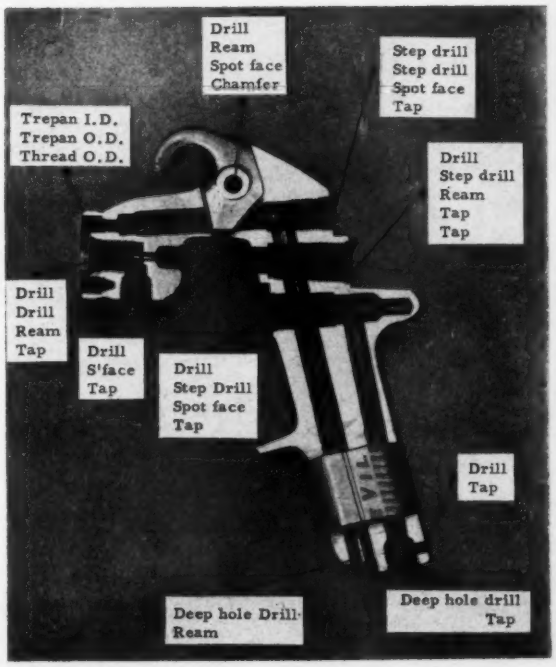

Fig. 1. A typical spray gun showing some machining operations.

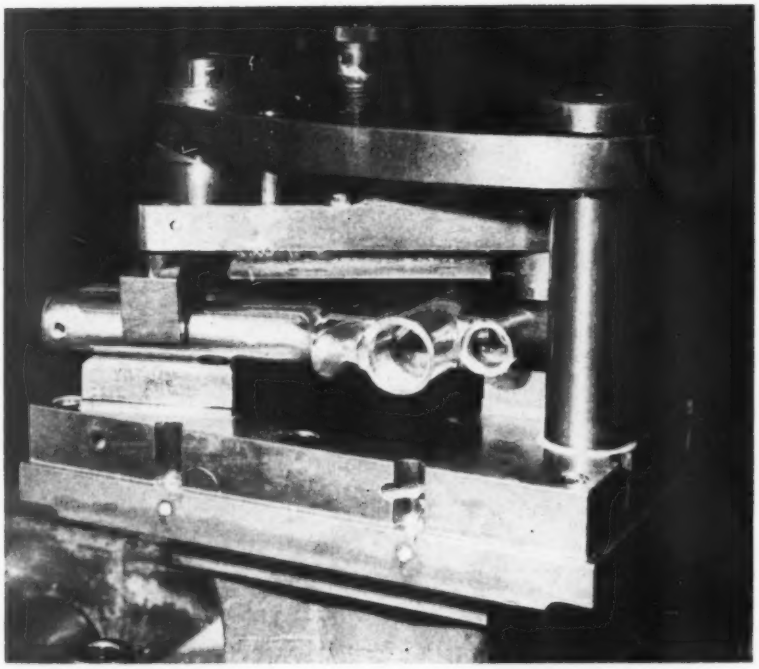

Fig. 2. Pallets were designed to handle seven different models. To do this, interchangeable locating pads are used.

products, DeVilbiss decided automation was the answer. They anticipated: Increased quality, more firm production schedules, a manpower savings, a saving of floor space, and a saving by not attempting to renovate the old machines.

Before the decision they had to know how they could produce a variety of spray guns on one automated unit, since none of their models required the production to keep an automatic transfer machine busy. The answer was to group Drillmation building block components together as to sizes and capacities and arrange tooling accordingly. As it worked out, a whole year's production for each model was to be run off on a two-batch basis; as many as six different models were to be produced on the same machine, at different times throughout the year.

After months of planning and work, the machine was ready—a closed circuit, pallet type automatic transfer machine with 54 stations and 37 Drillmation power units. The pallets with their workpieces were to transfer from station to station by an air operated shuttle.

Since installation, each power unit has averaged over 6,000,000 cycles without major repairs. Along with this, the machine constantly maintains tolerances of from one to two thousandths. This is the prime reason for the close to zero scrap factor.

A Central Control Panel is the sensing sequence or "brain." In the event of a breakdown, a series of lights signal which station is offending, which power unit and/or which fixture is at fault. This way, locating trouble spots has been reduced from hours to seconds.

Approximately 850 electrical devices, together with 18 miles of wire, make up this "complex." The electronic tabulator uses its share of these electrical "elves" to record each cycle of each Drillmation power unit. This is a preventive maintenance measure to tell service personnel when to "go to work." The feature saves on the tool replacement cost and is another factor responsible for little or no scrap.

Coolant and cutting oil is supplied from a large under-the-floor tank and returned through a trough in the floor. Four cen-

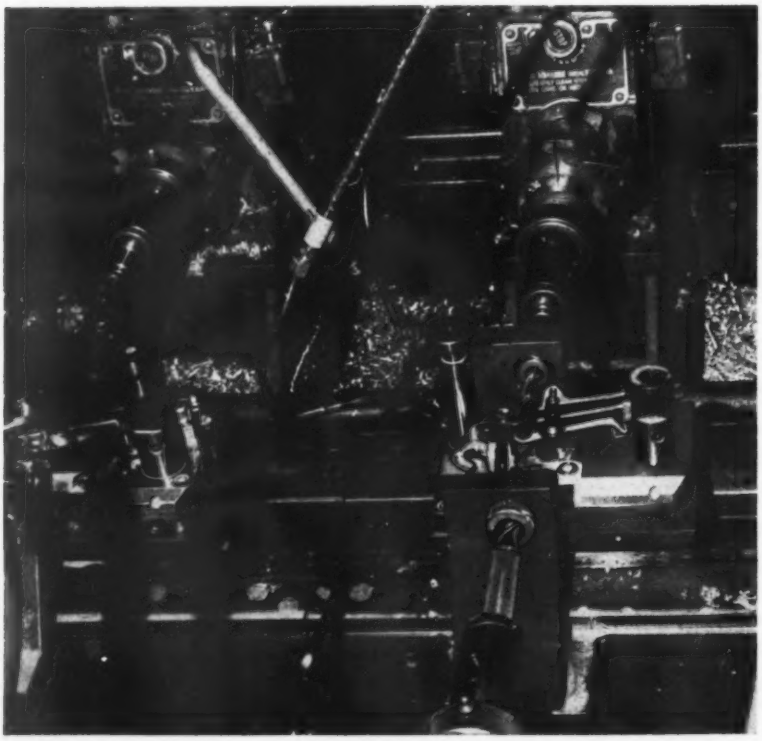

Fig. 3. Here a pallet's station-position is being set up. Tools are cycled manually into the cutaway prototype and the pallet stops set when position is right.

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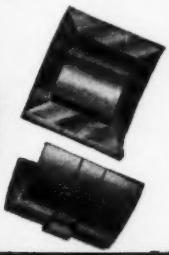

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Master Feed Fingers and Pads

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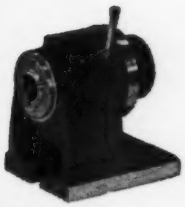
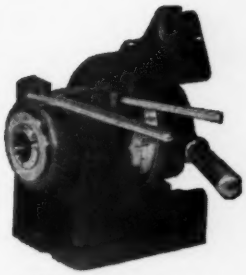


H-4 Tool Room-Inspection



HV-4 Production

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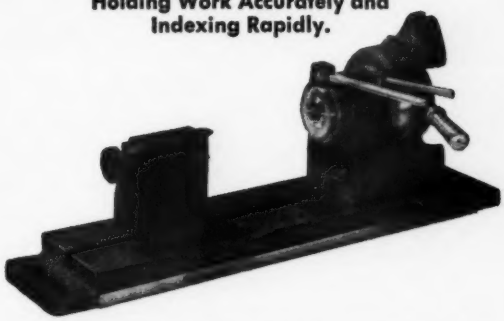

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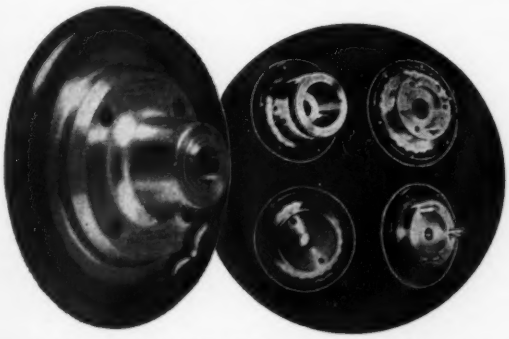

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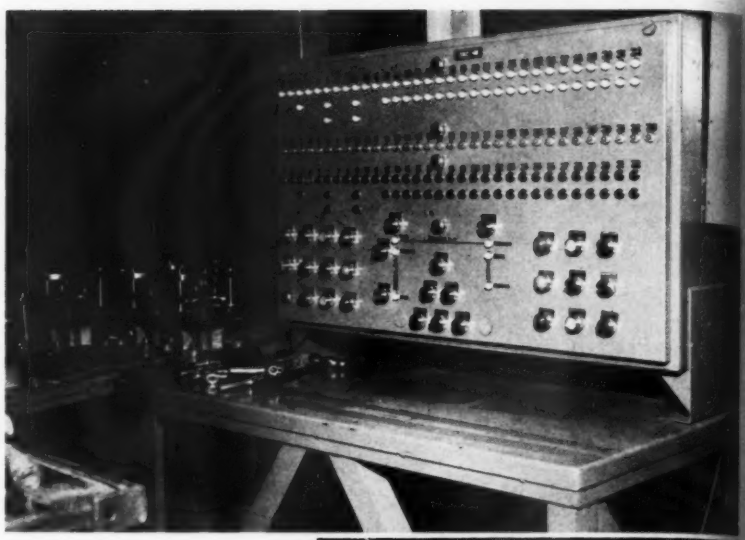
tral pumps supply all stations.

Chip control taxed the ingenuity of DeVilbiss and the Drillmation engineers. Although each power unit was set to produce its optimum chip shape and size, small chips would periodically find their way into the index pin holes, resulting in the pallets being out of position. An automatic stop was provided for this event.

Originally many hours were spent removing chips from the index pin holes. Previous to removing chips, air had to be released from the shuttle cylinders which were then manually retracted. After the offending chips were removed everything had to be repositioned manually. This time-consuming procedure was alleviated by the installation of opposing shuttle cylinders. With this arrangement they could be moved in either direction. Now chip removal is accomplished in minutes, as compared to the four to six hours needed before.

Three men are required to operate the machine—loading, unloading, and monitoring are handled by one man; the other two are service men who change tools, take care of all maintenance, and also set up for model change-over.

A unique method is used to align tools, set their depths, and position pallets to work stations. It's done by placing a cutaway prototype or previously finished workpiece in the pallet. The pallet is then manually indexed from station to station, and each power unit manually cycled to it. Index stops are set when tools are located in respective prototype work area (Fig. 3). In this way each station can be visually checked and adjustments made before running "automatic."



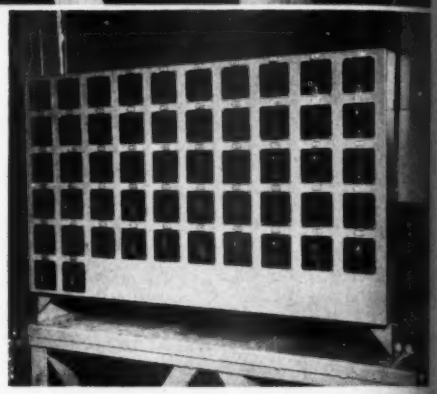


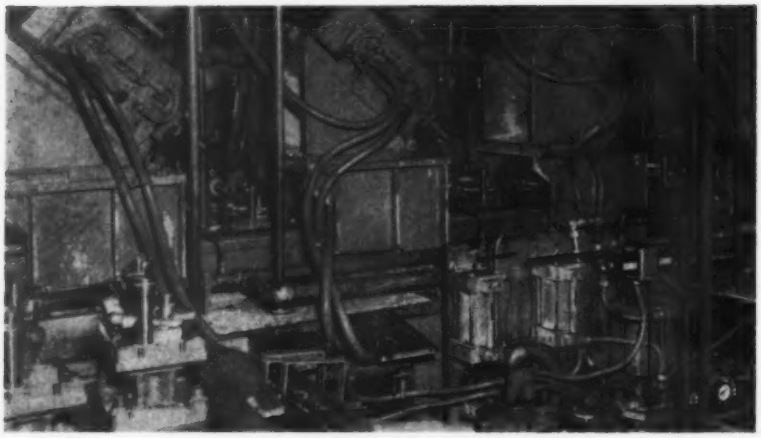
Fig. 4. The central panel reduces trouble shooting from hours to minutes. The back of the panel records each cycle of each tool. Knowing the capabilities of each, the operator can replace tools before they go beyond their peak efficiency.

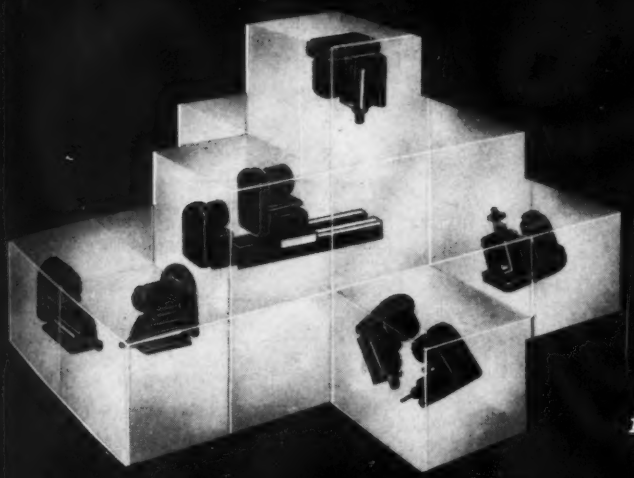
The machine presently accommodates two changeovers per year for each model. Each changeover means between 10,000 — 20,000 parts to be produced at a maximum rate of 2 pcs/min or 800/day.

It was estimated that the old method would require 35 operators, using 20 multiple spindle machines, to equal the work of this "automaton" for any given time — at that, quality would not compare. Further, 4000 sq ft was previously used whereas the transfer machine requires only 1000 sq ft. —W.E.H.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18.

Fig. 5. These Drillmation power units are used only when drilling certain models. Note loaded pallets traveling on shuttle under the power units. Shuttle's air system is at lower right.





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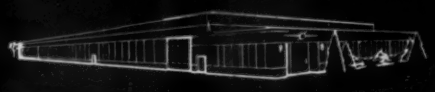

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Optical Polygons: The Ultimate

. . . for setting up angles
. . . for checking angles

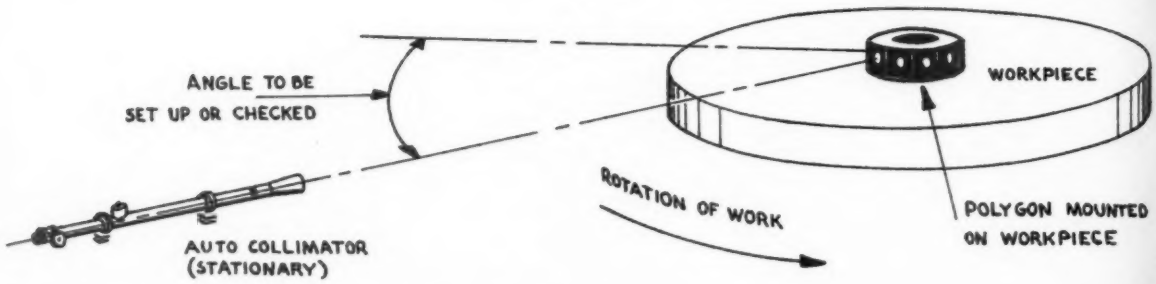


Fig. 1. In use, the Optical Polygon is mounted on the center of rotation of the part to be set up or checked. A collimator is placed on a stationary outboard platform and zeroed on any one of the polygon's targets. Part and polygon are then rotated together the desired angle that coincides with the angular spacing of the targets. If projected line (see Fig. 2) zeroes out on this target the angular movement is exact. Or, any error can be read on the collimator reticule. This might have been one step of the procedure for establishing (and recording for reference) errors in a dividing head.

WHEREVER AN ANGLE is to be generated by two or more elements of an assembly (part mounted on part etc.), two or more loci on one piece (holes in a plate etc.), or two or more loci in space (tool or machine component relationships etc.), a means of setup and/or gaging the angle is necessary. The setup or gaging has to be done with a "tool" appropriate for the required tolerance.

Optical polygons furnish an easy, very accurate method of setting up or checking close tolerance angles. Webber Optical

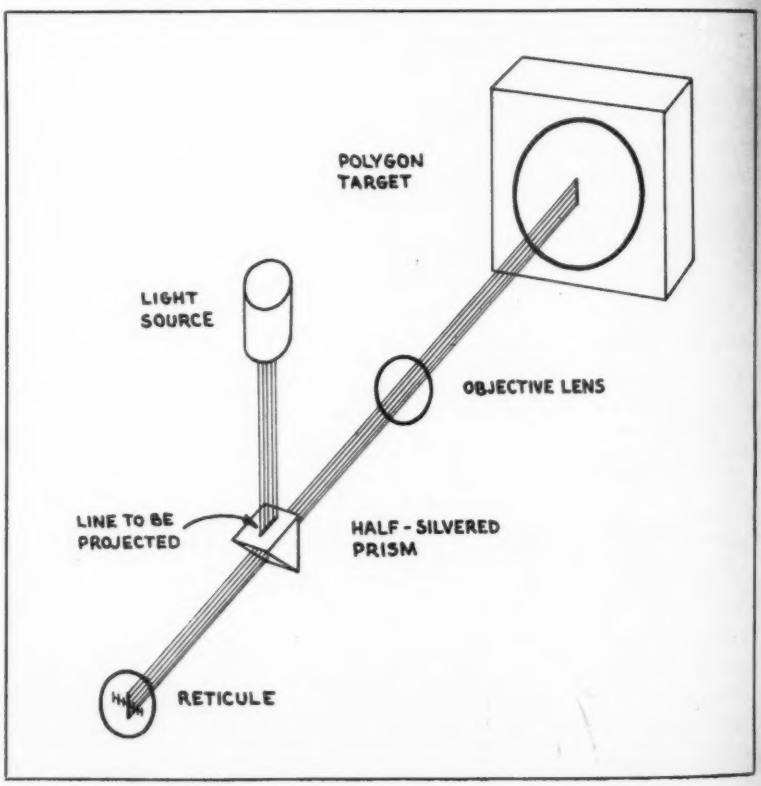
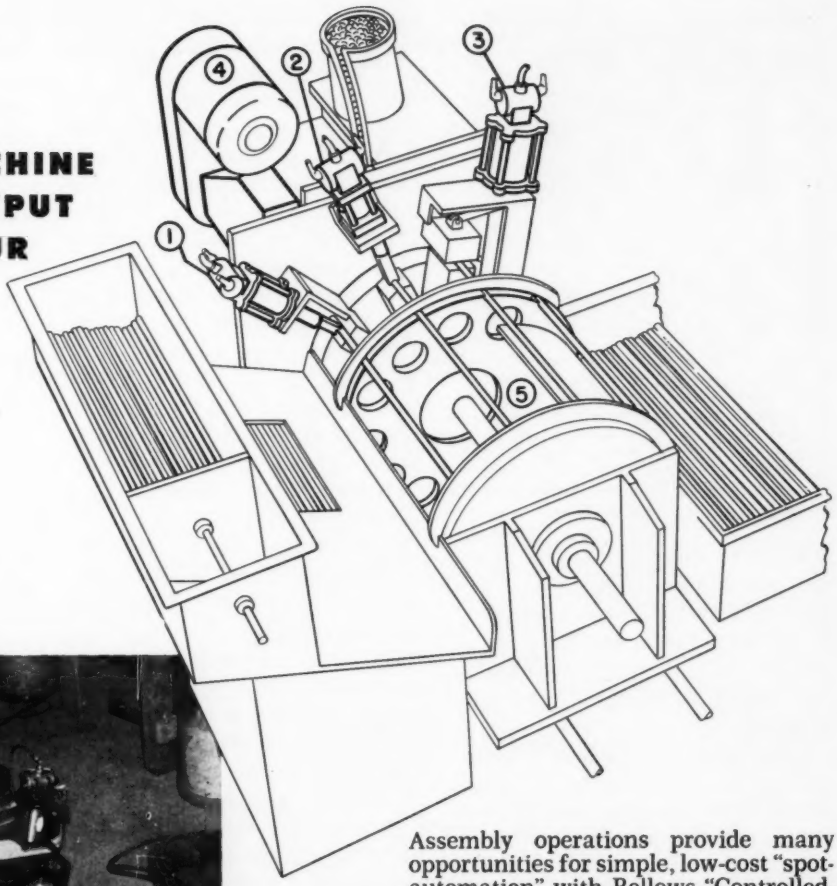
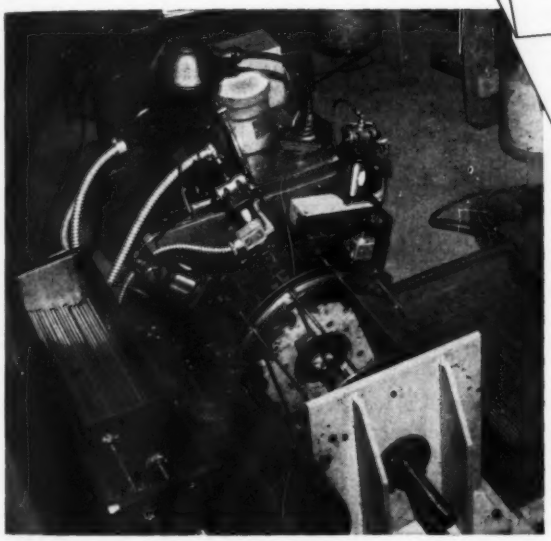


Fig. 2. Light is beamed on the collimator prism which projects the line on its surface to the polygon target. The line image is reflected back through the prism to the measuring reticule. Reticule graduations indicate any angle existing between projected beam and reflected beam. This angle is actually twice the existing error of the angle to be set up or checked. No interpolation is necessary since collimators are equipped to read direct.

THIS SHOP-BUILT MACHINE INCREASED OUTPUT PER MAN-HOUR 500%





Incorporating five Bellows Air Motors (#1, #2, #3, plus two others, horizontally-mounted, not visible) and a Bellows Drill Unit (#4), all electrically interlocked with the vertically-mounted Bellows Rotary Table (#5) which feeds the workpieces through the various operations, this machine counterbores one end of a .300" brass tube, inserts a small plastic seal, curls the end of the tube to retain the seal and delivers the completed antenna sub-assembly into a hopper ready for plating.

Assembly operations provide many opportunities for simple, low-cost "spot-automation" with Bellows "Controlled-Air-Power" Devices. Costs go down immediately as these versatile work units boost the productivity of each worker.

A case in point is this machine, built entirely around Bellows "Controlled-Air-Power" Devices, which performs an assembly sequence in the manufacture of automobile antennas. Designed by the Plant Superintendent working with a Bellows Field Engineer, the unit requires only one operator (who merely loads and unloads hoppers), yet produces the same number of pieces as five assemblers working manually.

This machine is typical of the ways that cost-conscious men are using Bellows "Controlled-Air-Power" Devices — either singly or in combinations — to perform a virtually-unlimited range of operations. It's almost a certainty that Bellows units can help you meet — *or exceed* — cost reduction goals in *your* plant, too.

THIS SPOT-A-MATION IDEA FILE IS YOURS ON REQUEST

Contains installation data, wiring diagrams and equipment lists for numerous Bellows "Controlled-Air-Power" applications, enabling you to automate existing machines or build your own low-cost special-purpose equipment. Write for yours today. Address Dept. TP1259, The Bellows Co., Akron 9, Ohio.

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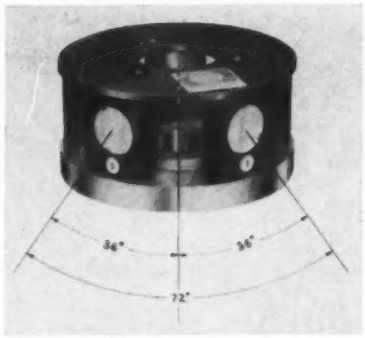

Fig. 3. A polygon with an odd number of targets showing the line of sight between two targets to an opposite target. Double sided targets allow polygons with an odd number of targets to be used for twice the number angles as there are targets. This is an exclusive with Webber Polygons.

Polygons offer an entirely new polygon concept. They are calibrated to the extreme accuracy of 0.2 sec of arc, and they are economical, abrasion resistant, and built to last for years of hard shop use.

They are used with small telescopes (auto collimators) that beam a line image to one of the polygons' reflecting surfaces. The collimator receives the reflected image back through its prism to the eyepiece with reticule graduations, and adjustment, offer an easy readout of the reflection angle.

The reflecting surfaces of the target elements are hard chrome carbide, optically flat to 0.000002". Target mounting surfaces are also lapped to a "perfect" 90° with their reflective elements. The hardened tool steel polygon mounting plate, for target assemblies, gets the same treatment until flat.

Target assemblies are then wrung on the mounting plate. They are positioned to a near correct angle with collimators and secured temporarily by screws. After final positioning, they are epoxy cemented—there can be no further movement.

Because chrome carbide is 20X more corrosion resistant than 18-8 stainless, and because its abrasion resistance is fantastically high, and thermal-stable, these target surfaces will remain optically flat and retain their initial reflective ability for life.

Exposed reflective diameters are a large 0.85". This size reflects light from a larger area than that of smaller standard targets and allows easier collimator setup. You can see this if you understand that the projected image of the line (on the colimator prism) doesn't have to pass through the center of rotation of the polygon.

Due to their construction, custom-made polygons can be furnished on short notice. They may have any number of sides of unequal or mixed angularity. And, for easy use, horizontally or vertically, they are furnished with a pilot hole, a knurled hold-down screw, and a bushing.

Normally made in sizes having from 3 to 72 targets, they can measure angles up to 120° in steps of 5°. Those with from 13 to 72 sides feature a built-in leveling device for easy adjustment to untrue surfaces. Here, fine levelling screws bring the polygon assembly into a plane, normal to the line of sights so that the declination angle through a collimator is 90° to all target surfaces.

Webber polygons with an odd number of targets (3, 5, 7, 9, etc.) can be used for angle measurements of double their number of targets. This is possible because all targets have two reflective faces; they are mounted in such a way that it's possible to see between target elements to the back of the target directly opposite the sight opening (see Fig. 3). For instance, if a 5-sided polygon whose targets are 72° apart were rotated 36° from any collimator zero reading, the back of a target will come into view to check a 36° angle—a unique advantage.

These essential tools are especially helpful for the calibration of "space age" instruments and guidance systems — minute angular errors in space vehicle components could mean errors of thousands of miles in outer space. But this is not the only area of applications for these ultra precise instruments. Other uses would include the spacing of gear teeth, the checking and calibration of dividing heads and rotary tables, or any place where high-precision angular spacing, indexing, or calibrating jobs are to be done.

We used a polygon to check out a dividing head and can vouch for the simplicity of operation.

Extra copies of this article are available while supply lasts. Write Tooling & Production Magazine, 1975 Lee Rd., Cleveland 18.

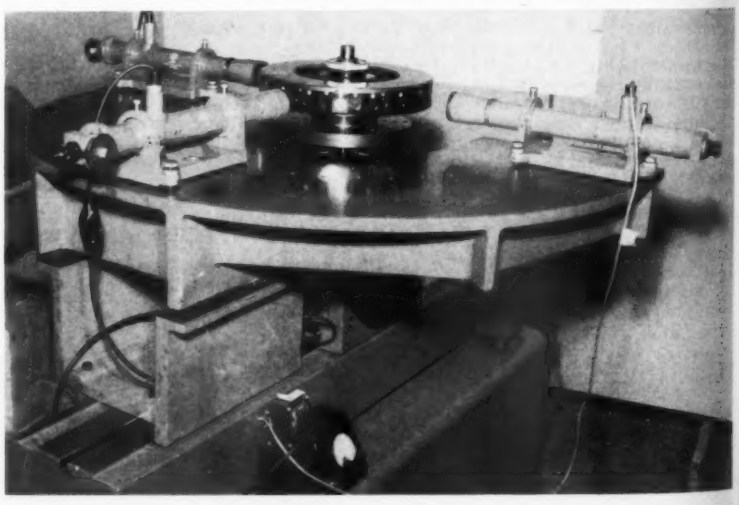

Fig. 4. A Leitz dividing head is used for close positioning of polygon targets during their initial setup. Final positioning is done with strategic positioning of an appropriate number of collimators.

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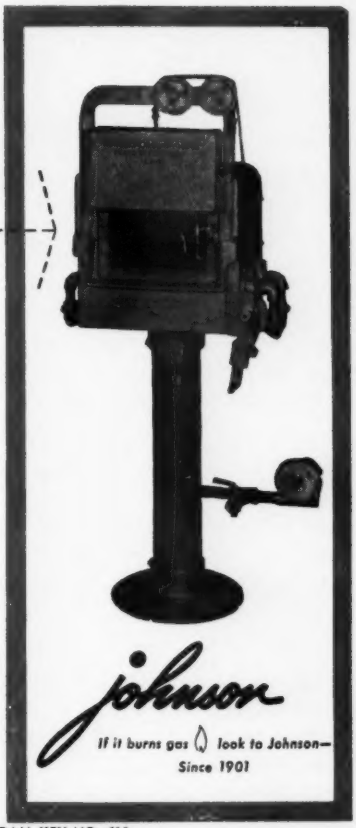

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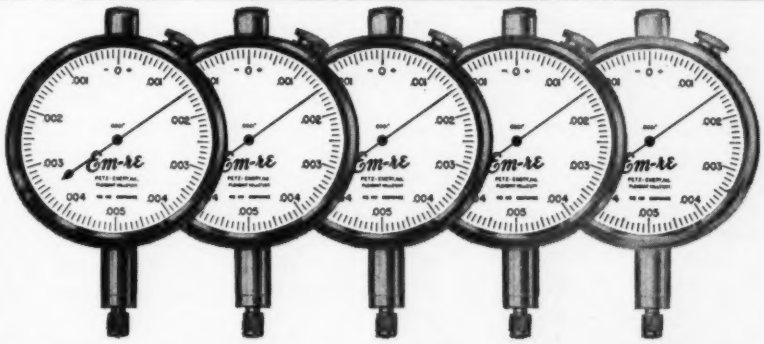

Dial Indicator Repeatability

The repeatability of "Em-re" Dial Indicators may not be quite as consistent as a photograph—but it comes mighty close! How close? . . . Well, "Em-re" Indicators will repeat consistently to an accuracy of 1/5 a graduation. On a .0001" indicator that's a repeated accuracy of .00002" (twenty millionths).

You need dial indicator performance like this to measure today's increasingly closer tolerances. With an "Em-re" you *can* measure to these closer limits—accurately and dependably. And "Em-re" accuracy permits an operator to use practically *all* of his allowed working tolerance. "Em-re" Dial Indicators are fully jeweled and completely shockproof throughout the entire range. They are now available in all four A.G.D. (American Gage Design) sizes, with 10 ranges from .002" to 1.000" and graduations in .001", .0005", .00025", .0001" and .00005".

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PETZ-EMERY INC.
PLEASANT VALLEY, NEW YORK

CIRCLE INFORM-A-GRAM KEY NO. 612

NOISE
. . . and your Neighbors

IF YOUR PLANT is now in a residential district, or if you plan to build in one, a good neighbor policy will pay dividends. And, noise, as well as appearance, must be considered in carrying out this policy.

Since there are great variations in noise acceptance, some neighborhoods will seldom complain while others, enduring an even lower noise level, will complain incessantly. A quiet district may find a comparatively small noise annoying.

These noisy facets of industrial life are more thoroughly explained by Howard C. Hardy, Chicago acoustical consultant, in a bulletin from the Small Business Administration. Briefly, Mr. Hardy explains:

Noise level is measured in "decibels" by a combination of microphone, calibrated amplifier, and indicating instrument. Ordinary speech has a 60 db rating, which falls near the middle of the audible range — 0 to 130 dbs.

Normally the ear finds high frequencies much louder and more objectionable than low frequencies. It's the high frequency of industrial noise, over and above background noise, that's most objectionable. An octave band analyzer is used for frequency analysis. The low frequencies, 37.5 to 300 cycles per second correspond to hums, thuds, and rumbles. The middle frequencies of 300 to 2400 cps involve roars and clangs. Higher frequencies of 2400 to 9600 cps relate to hisses or clicks.

Pressure measurement is analogous to measuring temperatures in heat-flow. For instance a large area at a low temperature may give more heat than a smaller area at a higher temperature. Similarly a small area giving off an intense sound will not necessarily send out as much noise as a larger area emitting a low sound.

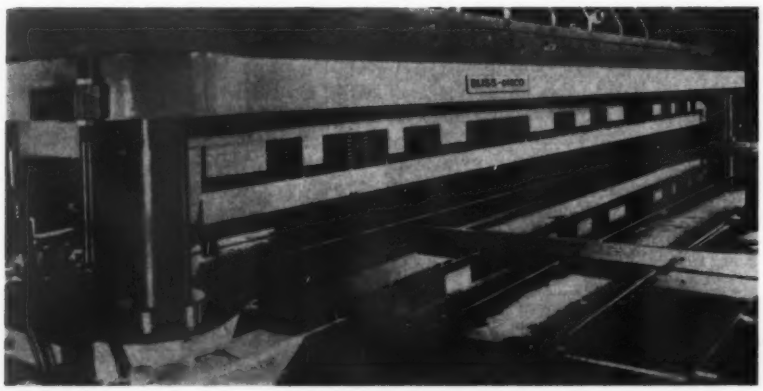
If noise is to be abated you must know where it comes from. Usually it's from one or more of these sources: 1) manufacturing operations heard through open windows, 2) fans and blowers, 3) high speed air or steam, or 4) materials handling activities, including hauling and deliveries.

Closing windows is not usually the solution to correcting noise. For example, closing every other window of a "ribbon," will only reduce the level 3 dbs, if they are all transmitting equally. Even closing nine out of 10 will only reduce the sound 10 dbs. Sound can be prevented from going out windows, however, by the addition of traps. They can reduce sound from windows 15 dbs and still allow air circulation. The cover can be simply sheet metal with fiberglass lining. The amount of internal noise getting out can also be reduced by the use of sound absorbing materials within the building.

Fans and blowers are a common source of noise. The easiest way to reduce this noise is to reduce the fan speed. Reducing fan speed by half will usually reduce its noise by 15 dbs, although it is not usually necessary to make such a drastic speed reduction. Next best thing would be to beam the sound in the least objectionable direction or to put mufflers in the intake path.

Another method of lowering shop noise in the neighborhood is to use walls, fences, or shrubbery, says Mr. Hardy. There is not much benefit though unless such enclosures are high enough and close to the source of noise. Shrubbery has little effect except when very thick.

—W. E. H.



Large Die Set For Press Brake

Piercing and forming on a press brake is possible with a large die set made by E. W. Bliss Co. The die set, 138" long, 28" wide and 10½" thick, is being used by Food Machinery and Chemical Corp. in a press brake operation which pierces and forms channels from flat stock for conveyor side rails.

HERE'S PROOF OF PERFORMANCE:

"CLAUSING – BEST VERTICAL MILLER FOR SMALL PARTS MANUFACTURING"

"Any job within the capacity of the machine can be handled easier, and up to 50% faster, on a Clausing than on any other mill. And, its accuracy is not exceeded by mills costing more than twice the price – in fact, we use our Clausings for some of our jig bore work. You just can't beat it for small parts manufacturing."

Harold Meyers, Meyers Machine Co., Grand Rapids, Mich.

VERIFIED ACCURACY — Before it leaves the factory each CLAUSING MILL must pass rigid tolerance tests such as:

1. **Top of table perpendicular to column ways within .0005" in 6" travel.**
2. **T-slots square with cross slide dovetails within .0005".**
3. **Table, parallel to turret within .001".**
4. **Spindle square with table, front to rear, within .001" T.I.R. in 5" circle.**
5. **Spindle taper (internal) runout within .0002" at spindle nose.**
6. **Table T-slots parallel to table dovetail ways within .0005" in 8" longitudinal travel.**

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It has sensitivity you don't get in larger machines. That really pays off in accuracy and efficiency on *every* job using small cutters.

And, the Clausing is an outstanding producer – "most versatile, easiest to set up, get around and operate of any miller at or near its low price". Only $875 f.o.b. factory. See it before you buy *any* mill.

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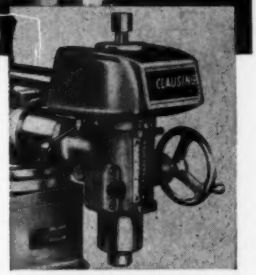
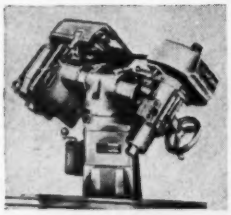


The high precision spindle and drive have 7 ball bearings . . . hardened spindle. Ground and hard chrome plated quill has full length bearing in head.



The spindle head can be swiveled in a vertical plane and set at any angle, and turret rotated in a horizontal plane making it possible to machine at all angles with one set-up.

CLAUSING

CLAUSING DIVISION
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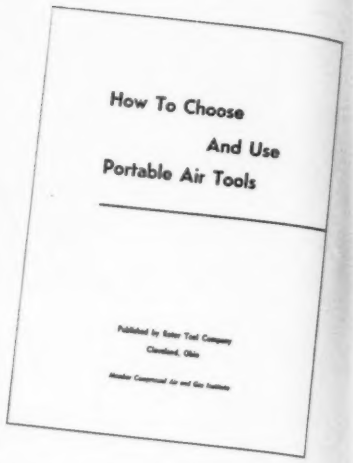
CIRCLE INFORM-A-GRAM KEY NO. 63

New Book on Portable Air Tool Cost and Economy

Ways to get more productivity from portable air tools, and thus cut costs, can be found for both large and small operations in a comprehensive new handbook. "How to Choose and Use Portable Air Tools" discusses three approaches for getting more from your portable tool dollar.

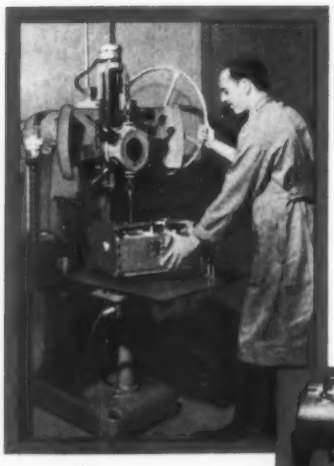
The first describes how production can be increased by proper operation and handling of these tools. The second deals with maintenance of portable tools so they give close to maximum, original power. After existing tools are working at proper air pressures and are receiving good maintenance, the final approach examines the individual tools to be sure the operator has the right tool for the job.



Average situations, practical to the shop man, are the basis for these discussions. In addition, this 90-page handbook also contains safety hints, case histories, and many illustrations. Get your copy from The Rotor Tool Co., 26300 Lakeland Blvd., Cleveland 32, or Circle Inform-A-Gram No. D3.

$3450 BURGMASTER Turret Drill Replaces $11,000 Machine . . . .

Reduces Machining Costs and Saves 75% Floor Space



Cadillac Gage Co., West Coast Division, Costa Mesa, California, now uses a Burgmaster 1C Six Spindle Turret Drill to effect substantial savings in machining costs and floor space on a complex rocket part.

In the setup shown, six operations are performed by the turret which power indexes at operator command, confining all operations at one point, reducing jig shifting and eliminating miles of operator walking. Standard tools are used rather than expensive quick change types. On complex parts like this, tools can be changed as needed to perform a wide variety of operations such as drilling, reaming, tapping, boring, c'boring, c'sinking, spotfacing, etc. Pre-selective, automatically shifted spindle speeds and pre-set, adjustable depth stops assure top machining efficiency on all operations.

Rocket part is held in jig for performing operations from three sides. In setup shown: drill 31/64", ream .500", spotface 1½", drill 31/64", ream .500", AND port cutter for 7/16-20 thread. Depth tolerances are ± .002".

Model 1C — 12 speeds from 325 to 4050 ½" Drill and Tap Capacity in Cast Iron — 1 H.P.

$595 Burgmaster Bench Model Turret Drill Replaces $3125 Machines.

Galvanometer Bodies are Machining 63% Faster—Tolerances ±.0005". Saved 650 miles jig moving per year, ⅓ floor space.

Dealers in important Industrial Centers. Write for literature — Covers machine and accessories.

Bench Model "O" — Speed ranges from 350 to 6200 RPM — ¼" Drill and Tap Capacity in Steel — ⅓ H.P.

World's largest manufacturer of Turret Type Drilling and Tapping Machines

BURGMASTER CORPORATION

SMALL TOOL DIVISION — BURG TOOL MANUFACTURING CO., INC.

15001 S. Figueroa St., Box 311, Gardena, Calif. • Phone: FAculty 1-3510 — Phone, wire or write Dept. OA

CIRCLE INFORM-A-GRAM KEY NO. 64

Roll Form Design Cuts Die Changes

Almost all die changes have been eliminated on a press brake at Minneapolis-Honeywell Regulator Co. The company uses O'Neil-Irwin Manufacturing Co.'s new Di-Acro Rol-Form die made with two 1/2" dia half-rolls of machined hardened and ground rod that pivot in sockets on either side of a bed block. Metals up to 1/4" thick and up to 12' long can be handled.

One 60° male punch forms any angle up to 60° depending upon depth of penetration, which is controlled by adjusting the ram or bed of the press brake. This makes it easy to compensate for springback when developing a part. Work marking seldom occurs because the material rests against the flat surfaces of the half-roll throughout the forming operations.

Here's the quick, low-cost way to get any Controlled Surface Finish

Are you paying more than necessary to obtain *controlled surface finishes?* You probably are if Gisholt Superfinishing is new to you. You are losing time, money and paying a premium for quality as well, on many jobs.

With Superfinish you preselect the surface finish you need—as high as 80 or as low as 1 micro-inch RMS—and you get it faster, at less cost than by any other method. Rather than an expensive extra step, Gisholt Superfinishing actually eliminates tedious, more costly processes.

Not only do you save time and money, but you get a "controlled" surface finish, free of smear metal—with the true base metal exposed—one that provides greater area contact for heavier loads and longer life in your specific application.

Whether your job requires a 1, 20 or 80 micro-inch finish, setup is fast and easy. Nothing is left to the operator's skill or judgment. Stone pressure and grade, and reciprocation rate are preselected to produce the finish you require, for job lots or large production runs.

It will pay you to find out how Gisholt Superfinish can cut costs, improve quality and lengthen service life on your standard or problem parts. Ask your Gisholt Representative or write for Bulletin 1169.

GISHOLT MACHINE COMPANY

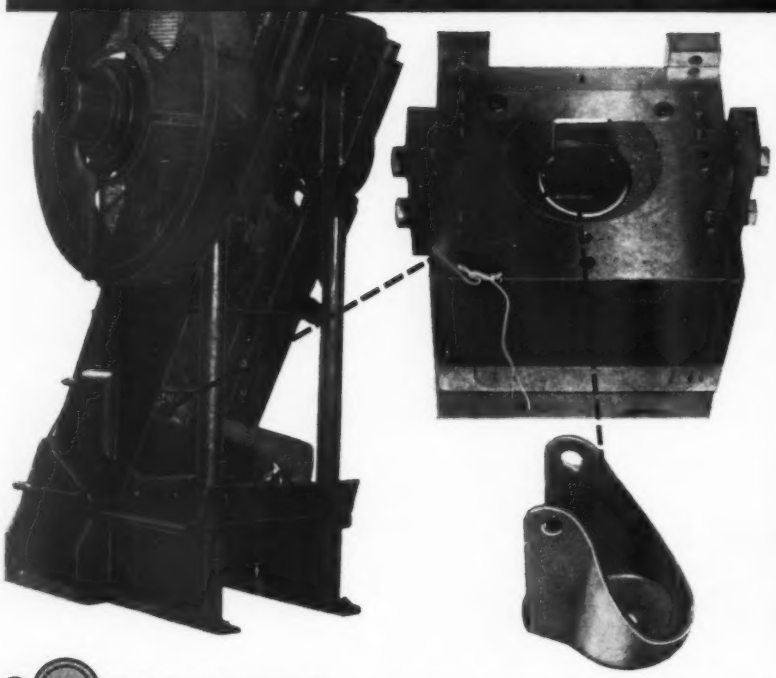
Madison 10, Wisconsin

Investigate Gisholt's Extended Payment and Leasing Plans

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

CIRCLE INFORM-A-GRAM KEY NO. 65

Talide® DIE IN SERVICE 8 YEARS DRAWS 9,000,000 CASTER PARTS!

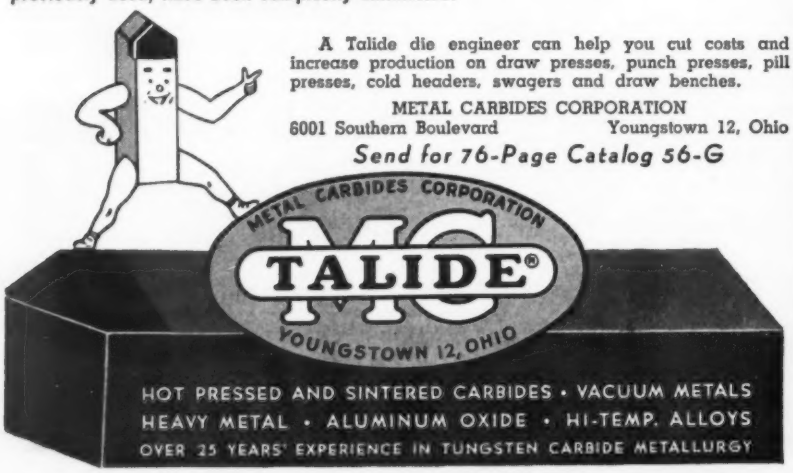


Bassick COMPANY, Bridgeport, Connecticut, leading producer of casters, chair controls, automobile and specialty hardware, was experiencing difficulty drawing an eccentric shaped chair caster part from commercial quality hot rolled drawing steel.

Scrap rate was high—production per die low. The high-speed steel die being used (costing $350.00) had to be reground and polished every 30,000 pieces, and replaced several times a year.

A Grade C-85 Talide die (costing $1100.00) was installed in 1950 and to date has produced over 9,000,000 caster parts. During this 8-year production run, the Talide die has required no servicing and is still in operation.

Bassick Company engineers report that the quality of their product has been improved. Surface marks and scratches, caused by scoring and galling of the steel dies previously used, have been completely eliminated.

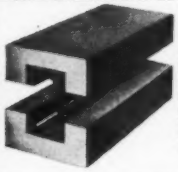

METAL CARBIDES CORPORATION
MC
TALIDE®
YOUNGSTOWN 12, OHIO
HOT PRESSED AND SINTERED CARBIDES • VACUUM METALS
HEAVY METAL • ALUMINUM OXIDE • HI-TEMP. ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

A Talide die engineer can help you cut costs and increase production on draw presses, punch presses, pill presses, cold headers, swagers and draw benches.

METAL CARBIDES CORPORATION
6001 Southern Boulevard Youngstown 12, Ohio

Send for 76-Page Catalog 56-G

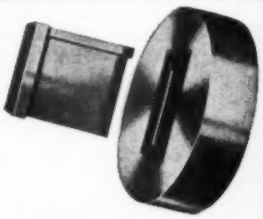
WIRE DIES
Hundreds of miles of steel and non-ferrous wire—.004 to .750—drawn through TALIDE dies.



SWAGING DIES
Leading fountain pen manufacturer cold swages 33 times more stainless steel parts with TALIDE dies.

HEADING AND EXTRUSION DIES
Cold heading ¼" C-1008 rivets, TALIDE dies produced 11,200,000 pieces, other carbide dies only 3,500,000.

CURLING ROLLERS
TALIDE curling rolls last 65 times longer than steel rolls on beverage can forming operation.



BLANKING AND FORMING DIES
70 times more paper discs blanked out with TALIDE—over hard alloy die.

SHEET METAL DIES

137,000 hi-alloy steel pressure vessels drawn with TALIDE against only 7,900 with steel dies previously used.

POWDERED METALLURGY DIES

Compacting highly abrasive chemical powders, TALIDE pill dies last 4 months; steel dies wore out in 6 hours.

CIRCLE INFORM-A-GRAM KEY NO. 66

READER SERVICE CARD — DECEMBER 1959 ISSUE

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(Please Print or Typewrite)

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CITY _____ ZONE _____ STATE _____

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5	19	34	72	611	804	914	953	1022	1111
6	20	51	73	612	871	921	971	1023	1112
7	21	52	74	761	872	922	972	1041	1113
8	22	55	75	762	873	923	973	1042	1114
9	23	57	77	763	874	924	991	1051	1121
10	24	59	79	764	881	931	992	1052	1122
11	25	63	81	765	882	932	993	1053	1131
12	26	64	82	766	883	941	994	1054	1132
13	27	65	96	781	884	942	995	1091	1141
14	28	66	98	782	891	943	996	1092	1142
15	29	67	101	783	901	944	1001	1093	

EDITORIAL ITEMS

C1	C15	C29	P6	P20	P34	P48
C2	C16	C30	P7	P21	P35	P49
C3	C17	C31	P8	P22	P36	P50
C4	C18	C32	P9	P23	P37	P51
C5	C19	C33	P10	P24	P38	P52
C6	C20	C34	P11	P25	P39	P53
C7	C21	D1	P12	P26	P40	P54
C8	C22	D2	P13	P27	P41	P55
C9	C23	D3	P14	P28	P42	
C10	C24	P1	P15	P29	P43	
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THESE INFORM-A-GRAM CARDS are for the convenience of TOOLING & PRODUCTION readers who, we know, rarely have stenographic help at their beck-and-call while reading. To get further information concerning selected items featured—all one needs is an INFORM-A-GRAM card and a pencil or pen to circle the numbers of the items wanted. If there is no identifying number, use the page number.

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7	21	52	74	761	872	922	972	1041	1113
8	22	55	75	762	873	923	973	1042	1114
9	23	57	77	763	874	924	991	1051	1121
10	24	59	79	764	881	931	992	1052	1122
11	25	63	81	765	882	932	993	1053	1131
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C7	C21	D1	P12	P26	P40	P54
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C9	C23	D3	P14	P28	P42	
C10	C24	P1	P15	P29	P43	
C11	C25	P2	P16	P30	P44	
C12	C26	P3	P17	P31	P45	
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Which article in this issue was of most interest to you? _____

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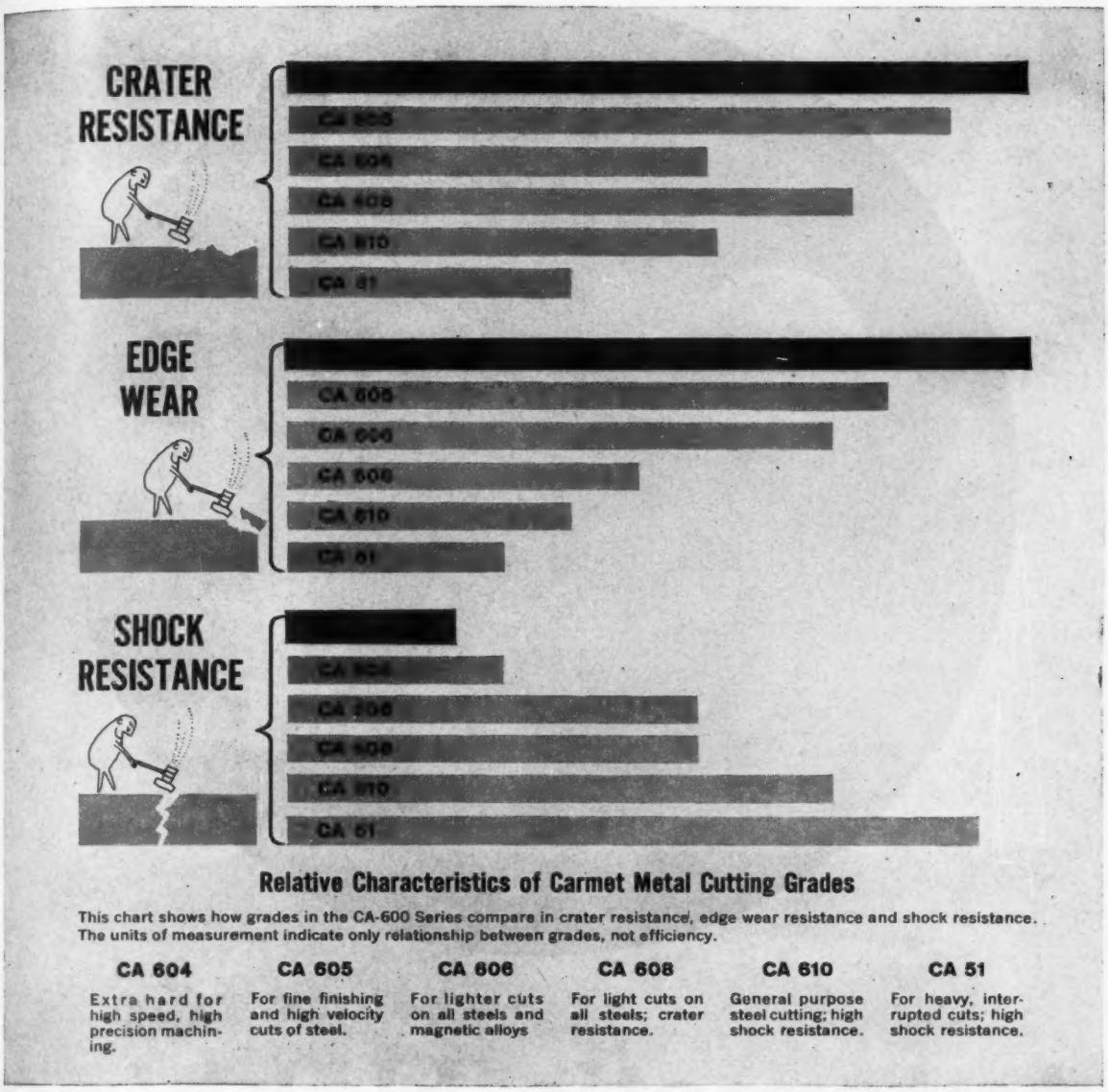


Relative Characteristics of Carmet Metal Cutting Grades

This chart shows how grades in the CA-600 Series compare in crater resistance, edge wear resistance and shock resistance. The units of measurement indicate only relationship between grades, not efficiency.

CA 604	CA 605	CA 606	CA 608	CA 610	CA 51
Extra hard for high speed, high precision machining.	For fine finishing and high velocity cuts of steel.	For lighter cuts on all steels and magnetic alloys	For light cuts on all steels; crater resistance.	General purpose steel cutting; high shock resistance.	For heavy, interrupted cuts; high shock resistance.

HERE'S THE QUICK STORY ON THE NEW CARMET® CA604

Super-hard cemented carbide designed for today's high-speed, high-precision machining of steel

Product of Allegheny Ludlum research, CA604 is now added to Carmet's crater-resistant 600 series. It is an ultra-hard tungsten carbide with unusually high crater-resistance, wear life and high strength at elevated cutting temperatures. CA604 is an outstanding performer in the fast cutting ceramic areas, combining high velocity finishing with light to medium feeds.

CA604 is offered in Indexable Inserts and Blanks by your Carmet distributor. He carries Carmet standard tools, holders and Indexable Inserts in stock and assures prompt delivery. Call him for help in selecting the proper grades and styles for economical machining—or write *Allegheny Ludlum Steel Corporation, Carmet Division, Detroit 20, Michigan.*

215

Write for New-Revised CATALOG C-16-B
CARMET CEMENTED CARBIDES FOR INDUSTRY

This 32-page book contains revised prices and complete specifications on Carmet's full line of cemented carbide tipped tools, blanks and holders. Speed and feed charts, grade comparisons and ordering information included.

ADDRESS DEPT. TP-24

CARMET

CEMENTED CARBIDE DIVISION OF
ALLEGHENY LUDLUM STEEL CORPORATION

CIRCLE INFORM-A-GRAM KEY NO. 67

Automatic Hobbing

The Multicycle versions of the Barber-Colman No. 6-10 and No. 16-16 hobbing machines are designed for maximum production of mass-produced parts or those which are to be changed at relatively frequent intervals. Automatic cycling is combined with easy setup in these standard machines to which standard units are added. These Multicycle machines are not special machines, but the standard units can be used in various combinations to produce your job most efficiently. These machines can also be equipped for automatic loading when desired.

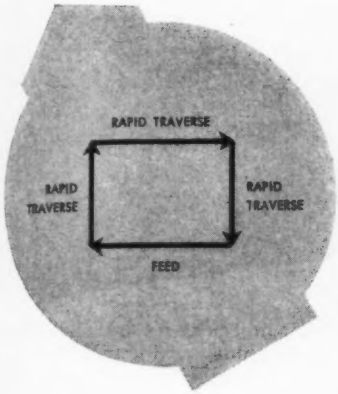
The machine is easily set up for automatic cycling. None of the Barber-Colman versatility is lost. Jobs can be changed as quickly and easily as ever. After the machine has been set up, the operator unloads, loads and presses the start button. Because of the automatic cycling, these machines are equally adaptable and efficient for the mass production of one specific part.

Reduce Approach Time

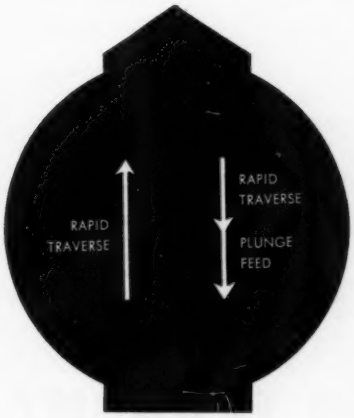
Approach time is often a high percentage of the total time required to produce a gear.

The plunge-approach cycle is designed to reduce approach time to a minimum. The horizontal feed is engaged at the start of the cycle so that the desired helix angle will be cut. The work feeds vertically into the hob until it reaches full depth. The vertical feed changes constantly from a fast feed at the beginning of

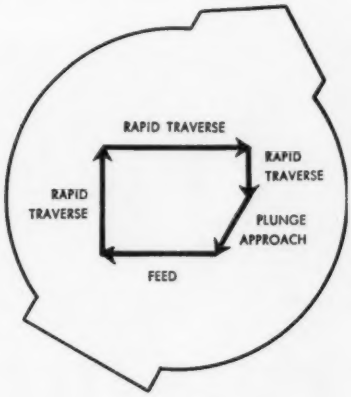
Any one of these automatic cycles can be selected simply by turning a switch on the control panel.



SQUARE CYCLE — automatic version of the conventional hobbing cycle.



PLUNGE CYCLE — automatic vertical feed for cutting worm gears.



PLUNGE-APPROACH CYCLE — combination of "plunge" and "square."

. . . with typical Barber-Colman versatility

the cut to a slow feed as the hob reaches full depth. The vertical feed and rapid traverse are controlled by the vertical feed cam. The rate of vertical feed is infinitely variable.

The plunge-approach cycle allows the use of larger hobs with more flutes or threads without an increase in approach time. More flutes can be used for greater accuracy and higher production, and more threads will normally result in an increase in production. This cycle can be used advantageously for cutting blind worms or blind gears.

Square and Plunge Cycles

These machines can be set up for square cycle with conventional or climb cut in either direction, and for plunge cycle for worm gears. Cycling is completely automatic for both arrangements.

Get Multicycle Production Estimate

Send us your gear prints for a production estimate on a Multicycle machine. Call your nearest Barber-Colman field office or the factory, WO 8-6833.

Barber-Colman Company

BARBER COLMAN

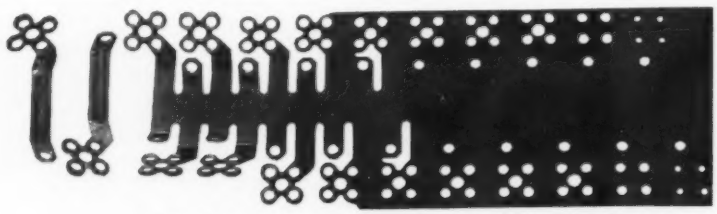
127 Loomis Street, Rockford, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 69

Catalogs and other helpful literature

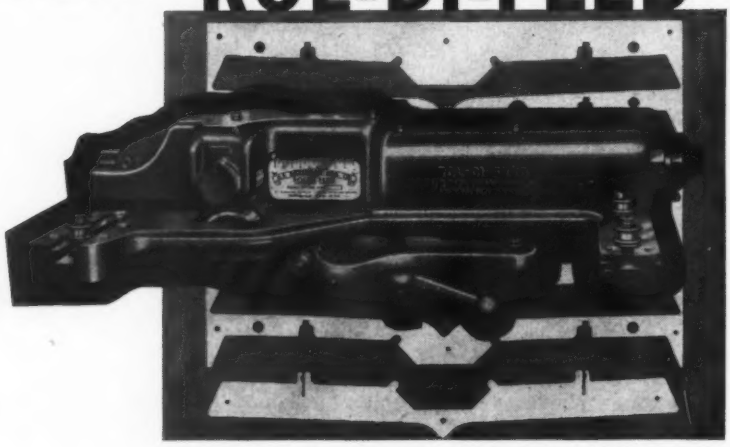
"Short Run Tooling for Long Range Economy" describes the designing, building, and manufacturing facilities for templates, jigs, fixtures, and dies. Write for your 24-page catalog to Arrowsmith Plastic Tooling, Inc., or Circle Inform-A-Gram No. C1.

Electronic Gaging Systems and modules are presented in a brochure which describes each system and shows typical applications. Write Radio Corp. of America, Industrial and Automation Div'n, for your copy, or Circle Inform-A-Gram No. C2.



50 to 55 strokes per minute, 2 pieces per stroke, with Dickerman 9" Rol-Di-Feed. Stock .073 Cold Rolled Steel, width 7 7/8".

PRESS FEEDING ECONOMY,
VERSATILITY *with Off-the-Shelf*
"Standard" **ROL-DI-FEED**



65 strokes per minute on each of 3 presses, 3 Dickerman 9" Rol-Di-Feeds. Stock .050 Aluminum, width 14".

Dickerman feeds eliminate costly special feeds in 80% of press stamping operations.

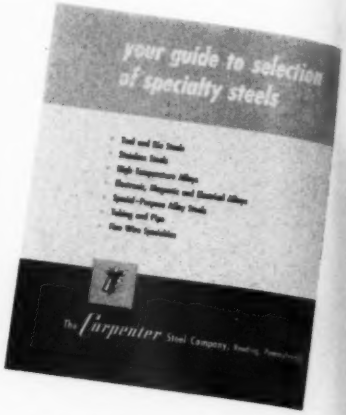
Dickerman

H. E. DICKERMAN MFG. CO.
321-339 Albany St. • Springfield, Mass.

Send for literature today . . . on the 14 Dickerman "standard" press feeds. This can add profits and production to your press room every operating day!

CIRCLE INFORM-A-GRAM KEY NO. 70

A Specialty Steel Buyer's Guide contains detailed information on tool and die steels, stainless steels, high temperature alloys, tubing, and pipe. Properties in chart form are given. Request a guide from The Carpenter Steel Co., or Inform-A-Gram No. C3.



A Numerically Controlled Milling Machine catalog describes advantages, specifications, and case histories of the tape controlled units. Write Pratt & Whitney Co., Inc., for a copy of Catalog 624 or Circle Inform-A-Gram No. C4.

Speedy Draw Presses are announced in a new catalog that gives construction details and specifications for 200 to 1250 ton machines. Catalog 2029-A is available from Steelweld Machinery Div'n, The Cleveland Crane & Engineering Co., or Circle Inform-A-Gram No. C5.

A High Strength Steel booklet contains graphs and charts on Potomac, a chromium-molybdenum-vanadium hot work steel. Get a copy from Allegheny Ludlum Steel Corp., or Circle Inform-A-Gram No. C6.

"A Simple, Effective Process Control Method" discusses specifications, elements, benefits, costs, and design of controlling quality during production with optical comparators. Also gives different plans. Get your copy from Jones & Lamson Machine Co., or Circle Inform-A-Gram No. C7.

Use This Tool Steel described in a bulletin for jobs where extreme accuracy of size and contour is needed. Properties and treatment instructions are given in Tri-Tung bulletin from Uddeholm Co. of America, Inc., or Circle Inform-A-Gram No. C8.

NEW FROM **FAIR STREET** • HOME OF MICROBORE

Microbore® adjustable tooling! with Kendex® throw-away inserts!

Accuracy! Economy! You get the best of both. Microbore, the single point cutting tool with Micrometer vernier adjustment becomes the tool holder—rigid, adjustable to precise accuracies in seconds. Kendex mechanically held throw-away inserts do the cutting. Triangular shaped, the inserts can be indexed from tip to tip. When expended, the insert is thrown away. Replacement is simple, costs far less than re-grinding. Inserts are held in place by *screw-on button* or *clamp* for fast indexing or removal. Available in sizes 3, 5, 7, 10, 15 and 20. Write for complete information on Microbore tooling with Kendex throw-away inserts, the latest development in Microbore—the complete tooling system.

DeVlieg® Microbore® System

DEVLIEG MICROBORE • DIVISION OF DEVLIEG MACHINE COMPANY

Fair Street · Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 71

CUTS INSPECTION TIME 75%

BAUSCH & LOMB

DR-25

OPTICAL GAGE

- DIRECT SCALE READING TO .0001"
- 0" TO 3" RANGE WITHOUT GAGE BLOCKS

"The new Bausch & Lomb DR-25 Optical Gage has let us cut total inspection and measurement time on our Teledyne Electrical Transmitters—high-precision gages to register and relay pressure data for telemetric readings—by at least 75%. We find that we no longer need gage blocks and special gages to meet our very rigid specifications."

Joseph F. Less, Plant Manager
Taber Instrument Corporation
North Tonawanda, N. Y.

Distributed in the U.S.A. through the DoALL Co.

BAUSCH & LOMB OPTICAL CO.
77348 Bausch St., Rochester 2, N. Y.

☐ I'd like an on-the-job demonstration of a B&L DR-25 Optical Gage. No cost, no obligation.

☐ Please send Catalog D-285.

Name, Title .....
Company .....
Address .....
City ..... Zone ..... State .....

Find out more about cutting inspection time and costs... MAIL COUPON TODAY

BAUSCH & LOMB

CIRCLE INFORM-A-GRAM KEY NO. 72

Catalogs . .

Work Holding Tools are featured in a new catalog that illustrates and describes over 68 items including drill vises, tables, and lathe milling attachments. Contact Chicago Tool & Engineering Co., for Catalog 27, or Circle Inform-A-Gram No. C9.

"Hydraulic Hose, Couplings, and Assemblies," a practical guide, outlines low to high pressure hose specifications and gives detailed thread and fitting data for both permanent and re-usable types of couplings. Get copy from Hydraulics, Inc., or Circle No. C10.

An Overload Detector, Circuit Master Mark III, is detailed in a bulletin that describes each phrase of operation and applications. Get your copy from Wintriss, Inc., or Circle Inform-A-Gram No. C11.

A Stock Straightener folder announces the new machines and explains their features. Folder is available from Dickerman Mfg. Co., or Circle No. C12.

"Carbide Burs," a 12-page catalog, gives complete specifications for all types of burs. Catalog CB-59 is supplied by Thomas C. Wilson, Inc., or Circle Inform-A-Gram No. C13.

A Hydraulic Press Brake catalog gives specifications on 150 to 1800 ton models and gives data on design details and advantages. Verson Allsteel Press Co., supplies Catalog HPB-59, or Circle Inform-A-Gram No. C14.

WEAR RESISTANT
THOMSON

60 Case

AVOID the HIGH COST and difficulty of fabricating long, hard & straight parts by conventional methods!

hardened and ground

SHAFTS, ROLLS, GUIDE RODS and other long-round parts

ELIMINATE WEAR and REDUCE COST

60 Case is the result of over 15 years of experimental work and production experience with hardened and ground shafts which are a requirement for BALL BUSHINGS, the Linear Ball Bearing manufactured by Thomson Industries, Inc.

The special techniques and equipment that have been developed enable high production rates and low handling costs. This permits big savings over conventional methods which are plagued with erratic warpage, straightening and resultant grinding problems. Finished *60 Case* parts frequently cost less than the scrap losses that result from conventional methods.

60 Case material has a surface hardness close to 60 on the Rockwell C scale which is essential to resist wear.

Long lengths of material ranging in diameter from ¼" to 4" are stocked to enable prompt shipment of *60 Case* parts, with or without special machining. *Write for literature and name of your local representative.*

For emergency needs call collect
MAnhasset 7-1800

ADVANTAGES of *60 Case*

- COST REDUCTION
- HARD BEARING SURFACE
- NICK-& DENT-PROOF
- ACCURATE DIAMETERS
- GROUND FINISH
- STRAIGHT PARTS
- DELIVERY FROM STOCK
- ADDED STRENGTH
- UNIFORM HIGH QUALITY

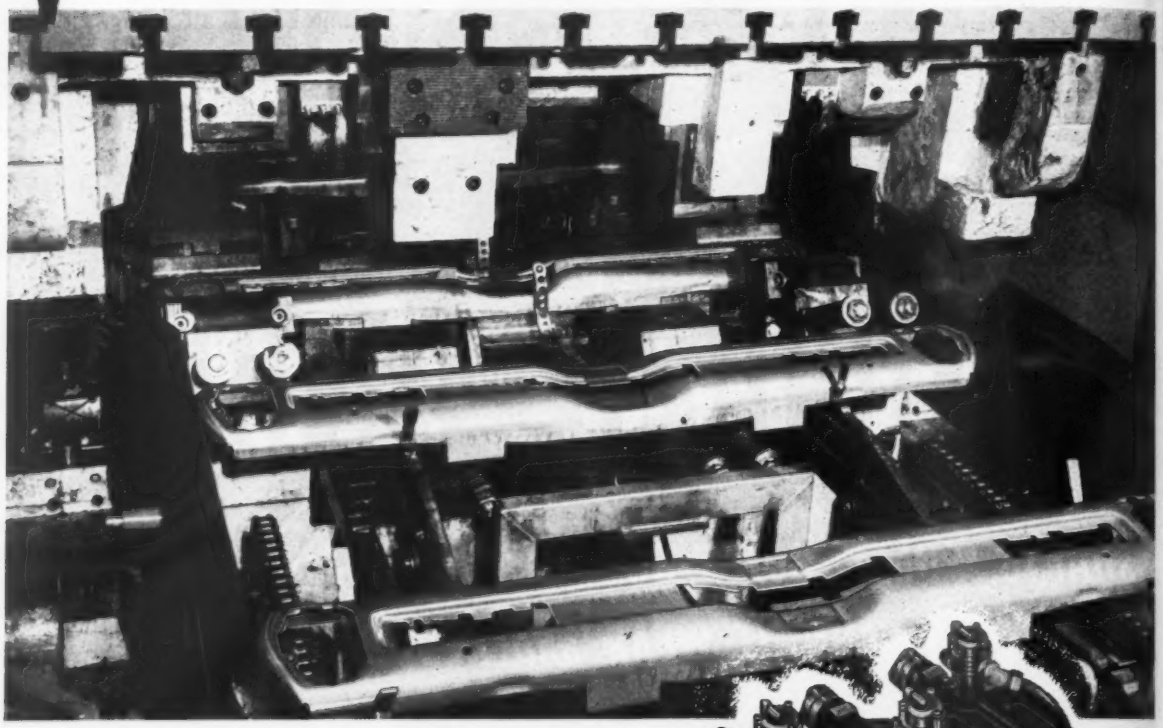
TYPICAL *60 Case* PARTS

GUIDE RODS • SHAFTING • ROLLS • TRAVERSE RAILS
PISTON RODS • ARBORS • LEADER PINS • TIE RODS
KING PINS • AXLES • CONTROL RODS • GUIDE POSTS
MANDRELS • BEARING ROLLERS • SPINDLES

THOMSON INDUSTRIES
Inc.
Dept. HH, Manhasset, New York
CIRCLE INFORM-A-GRAM KEY NO. 73

PARTS HARDENED to 60 C...
increase life...reduce cost!

Valvair® deceleration manifolds provide safe, velvet-smooth control of high-speed press transfer shuttles



Performance of Valvair deceleration manifolds on press transfers maintains a steady high rate of production through a major automotive manufacturer's fully-automated 5-press stamping line. Valvair design assures necessary rapid movement of the transfer mechanism, with precisely controlled deceleration of the 200 lb. shuttle at each end of the cycle. And, positive cushioning of shuttle travel prevents damage to the transfer mechanism . . . protects valuable dies.

Valvair's deceleration manifold assembly uses only three SPEED KING valves; two to control cylinder movement, and one as a directional valve to select free or restricted exhaust for cushioning. Just two limit switches are needed to control cushioning action — a quick adjustment of exhaust restriction precisely regulates cushioning rate. Simplicity of design, plus SPEED KING multi-million cycle dependability, assures peak production rates, with minimum in-service downtime.

If control of fast-moving reciprocating mechanisms is a problem in your plant, ask your nearby Valvair representative for his recommendations. He's only a telephone call away.

This press transfer indexes 26 in. per cycle, at a 1,000 cycle/hr. rate. Valvair's compact, 3-valve deceleration manifold controls its horizontal movement . . . requires minimum mounting space . . . simplifies piping and wiring.

For more information, write for Bulletin G-3A. Address Dept. TP1259, Valvair Corporation, Akron 11, Ohio.

Representatives in principal cities

Valvair AKRON 11, OHIO

Other INDUSTRIAL DIVISIONS of IBEC: The Sinclair-Collins Valve Co. The Bellows Co., Akron, Ohio • V. D. Anderson Co., Cleveland, Ohio.

8018

CIRCLE INFORM-A-GRAM KEY NO. 74

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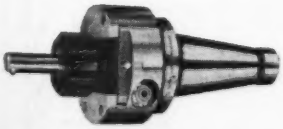
213

OTHER PRECISION-BUILT COST SAVING UNIVERSAL PRODUCTION TOOLS

Floating Chuck

Standard Collet Chuck

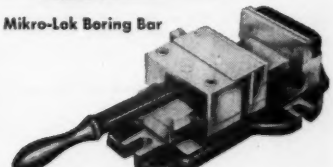
Mikro-Lok Boring Bar



Boring Chuck

"Kwik-Switch" Tool Holder

Standard Drill Bushing



Wedge-Lock Production Vise

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HERE IT IS... The BRAND NEW MAUSER INDICATOR

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- DIAL GRADUATIONS 20-0-20

FULLY JEWELED & SHOCKPROOF MOVEMENT
LARGE VARIETY OF CONTACT TIPS AVAILABLE FROM STOCK
CAT. #658
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- WILL ACCOMMODATE ALL INDICATORS WITH 8mm. SHANK

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CIRCLE INFORM-A-GRAM KEY NO. 762

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5 IMPORTANT ADVANTAGES

- **LOW COST** — costs only a fraction of hand-made pushers
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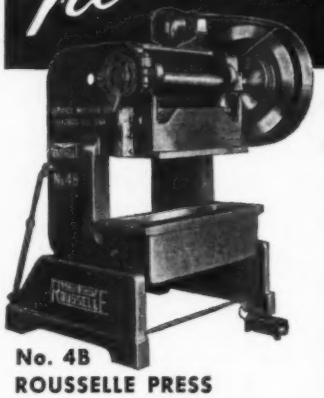
New 40-TON DOUBLE CRANK O.B.I. ROUSSELLE



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- "Plug-in" foot and hand controls.
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- Low air consumption.
- Large die area.
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CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES

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Mfrs. of Rousselle Presses
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Solid web and counter-balanced. Made of fine grain cast iron. Rims and handles are ground and polished to high lustre. Many sizes. Top quality and low prices.

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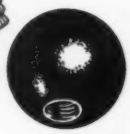
Assortment of many sizes ranging from 3/32" to 1-1/2" diameters. All springs 10" long. Made from music wire. Extension spring assortment also available.



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Made of plastic in round type as shown and in oval and mushroom types. Also supplied in round polished steel. Available in many diameters and thread sizes. Top quality and low prices.

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PORTABLE ELECTRIC
RECIPROCATING TOOL

This handy tool will cut out many tedious hand filing and finishing operations — Increase Production — Produce Uniform Work.

Light in weight — Delivers 1/8" or 3/8" fixed stroke at 1000 strokes per minute — Operates on 110 volts AC or DC.

ONE TOOL - UNLIMITED USES

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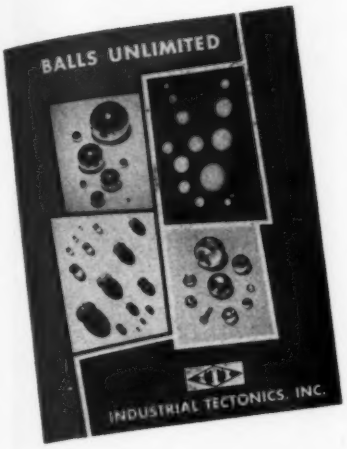
CIRCLE INFORM-A-GRAM KEY NO. 766

Catalogs . .



A Precision Balls Catalog discusses ball raw materials, methods of manufacture, precision, finish, sizes, and quantities. Write Industrial Tectonics, Inc., for a copy of "Balls Unlimited," or Circle Inform-A-Gram No. C15.

An Indexing Table, Incro-Table, for fast layout, machining, and inspection is described and illustrated in a bulletin. Applications data is included. Get copy from Calectron, Inc., or Circle Inform-A-Gram No. C16.

Heavy-Duty Contour Band Saw Machines are highlighted in a new catalog that describes the new features and applications. As for Catalog 59-46 from The DoAll Co., or Circle Inform-A-Gram No. C17.

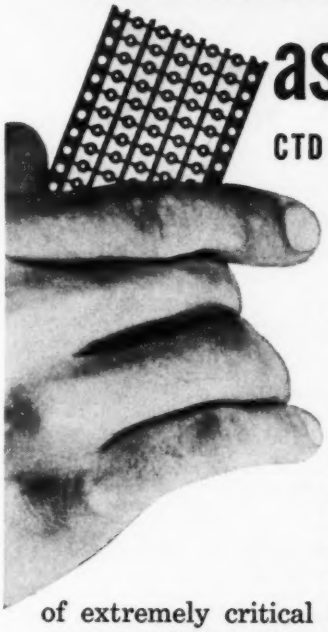
Cylinders for Automation are fully described in a 24-page catalog. Dimensional drawings are accompanied by application data and specifications. Bulletin 91017 is available from Airmatic Valve, Inc., or Circle No. C18.

A Punch Price List offers reductions on ball seat and shoulder punches. Price lists of other types of punches are also available from Pivot Punch & Die Corp., or Circle Inform-A-Gram No. C19.

Air Hydraulic Boosters are illustrated and described in a bulletin that shows how a booster works, how to select boosters from a handy chart, and how to apply the different models. Get Bulletin B-200P from Miller Fluid Power Div'n, Flick-Reedy Corp., or Circle Inform-A-Gram No. C20.

Cleveland Tool and Die
CASE FILE

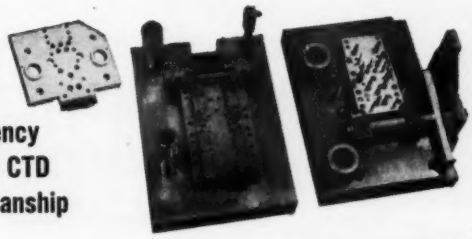
Reliability and quality assured to .001"



CTD PRECISION SECTIONAL DIES ASSURE QUALITY OF TEXAS INSTRUMENTS TRANSISTORS

Check the transistors in the next portable radio you hear, and chances are they'll read "TI" – trade mark of Texas Instruments Incorporated of Dallas, Texas. This aggressive company supplies leading manufacturers of computers, missiles and electronic equipment. For contour ground dies of extremely critical tolerances, TI chooses CTD sectional dies to stamp the tab sheets for the ultra-small semi-conductor wafer assembly within the transistor header. "Reliability and quality assured to .001" are musts," says Texas Instruments.

Another example of the important production efficiency made possible by CTD precision craftsmanship



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Send for brochure describing CTD's plant and facilities. FREE!

Cleveland Tool and Die Co.
30510 Lakeland • Willowick, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 77

AUTOMATIC RECESSING TOOLS—feature master holder, low cost interchangeable tool adaptors, double cam-follower pin design for better performance at lower cost.

FLOATING HOLDERS—a proven design, combined with interchangeable collets, cover a wide range of tap and reamer sizes to provide straight, accurate holes.

SHUR-LOCK ADJUSTABLE ADAPTERS—built to GMC, Ford, Chrysler, ASA standards. Concentricity .002" TIR 6" from nose.

SPINDLE EXTENSIONS—provide individual spindle adjustment and extend or alter existing multiple setups without costly retooling.

SLIP SPINDLES—for cluster plate applications. Used on multiple-spindle drilling machines.

DRIVERS—hardened, ground, precision-built, concentric within .002". Made to automotive, ASA standards.

BRACKET SPINDLE ASSEMBLIES—exclusive flat arm design permits adjusting without breakage. Precision machined for smooth, efficient operation.

MAGIC CHUCKS—feature quick change, interchangeable collet design and proven principles of construction insuring accuracy and long life.

TOOL CONTROL UNITS, PRESETTING GAGES—individually designed to control tool life. Standard units in 3 to 12 ft. lengths and special pre-setting gages to suit needs.

FOR THE LATEST IN NEW IMPROVED COST-CUTTING DESIGNS

Specify SEIBERT PRODUCTION HOLDING TOOLS

You can depend on Seibert's skill and practical tooling experience for new, improved ideas in production holding tools that offer cost-cutting advantages. New designs are being constantly developed and tested with only one thought in mind—to find better ways to improve present quality standards and reduce costs.

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CIRCLE INFORM-A-GRAM KEY NO. 781

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PUNCH and DIE MAKER

The Complete Low-Cost Answer to Your Larger Die-Making Problems

- ★ Tilting Power Ram Permits Working from *Level* Table
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- ★ Files Supported in both Upper and Lower Chuck . . . or in either
- ★ Saws to Center of 22½" Circle with Overarm, 28" with overarm removed
- ★ 20" square table — Special table available in 24" x 28" size

Send for PDM Bulletin, also Bulletins on Rice — Milwaukee Complete line of bench type Die Filers and Profile Grinders.

RICE PUMP & MACHINE COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 782

"650 metal stampings deburred in 10 minutes"

TIMESAVER Model TOP SPEEDBELT 12 ABRASIVE BELT SANDER

V. A. BOKER & SONS, Minneapolis, Minn., manufacturer of precision metal stampings reports:

"We processed 675 metal stampings using a Speedbelt 12 and 2 men in 1 hr. 40 mins. or 3 hrs. 20 mins. of direct labor charged against the job. By old deburring methods this run would have taken in excess of 20 hours. Another run of 650 metal stampings was completed in 10 mins., or 20 mins. direct labor compared to 4 hrs. by former deburring methods. These runs are typical of the savings in production time we have made on this type of work. We also find we are achieving a much better finish as well."

TIMESAVER "SPEEDBELT" SANDERS CAN HELP CUT YOUR PRODUCTION COSTS . . . TOO!

V A. Boker & Sons' experience is typical of the many installations where versatile, low-cost Timesaver "Speedbelt" Sanders have replaced slow, costly deburring, finishing and polishing methods. Timesaver Sanders are built in 12", 18", 24", 38", 50" and 54" models . . . a size and type to solve most polishing, finishing and deburring operations on solid or perforated aluminum, stainless steel and other metal sheets, bars and blanks.

INVESTIGATE the advantages of these amazing machines and hi-speed abrasive belt operations for your shop. Write for literature today.

TIMESAVER SANDERS

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CIRCLE INFORM-A-GRAM KEY NO. 783

Catalogs . .

Titanium Alloy for high speed flight is introduced in a 24-page catalog that lists properties, fabrication characteristics, and application data. Get "Properties of Ti-4Al-3Mo-1V" from Titanium Metals Corp. C21.

Strippable Coatings for protecting tools and metal parts are offered in a new bulletin that shows how and where to use the coatings. Get your copy from Bischoff Chemical Corp., or Circle Inform-A-Gram No. C22.

A Hydraulic Press Brake bulletin features a selection chart showing differences between mechanical and hydraulic brakes in use, tonnage, and stroke. Features and advantages are included in Bulletin 91 available from Niagara Machine & Tool Works, or Circle Inform-A-Gram No. C23.

An Automatic Positioning System for horizontal boring, drilling, and milling machines is described in Bulletin 759 available from The Cincinnati Gilbert Machine Tool Co., or Circle No. C24.

A Floating Board Drafting Table is introduced in a bulletin. It holds drawing position securely. Details and advantages are given in a bulletin from Stacor Equipment Co., or Circle Inform-A-Gram No. C25.

Vises, Chucks, and dividing heads are featured in a new catalog which explains and gives specifications for these tools. Get your copy from L-W Chuck Co., or Circle Inform-A-Gram No. C26.

"Socket Screw Products" gives dimension specifications for socket head cap screws, button heads, flat heads, and dowel pins. Get your copy from Standard Pressed Steel Co., or Circle No. C27.

A Manual Press Controls catalog has 16 pages of application data and ordering information and tells how they can be applied to manually operated stamping presses, air presses, riveters, and shears. Get Catalog 65b from Micro Switch, or Circle Inform-A-Gram No. C28.

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AUTOMATIC POSITIONING

with the

DIXI 75 horizontal optical jig borer

offers you increased

ACCURACY

VERSATILITY

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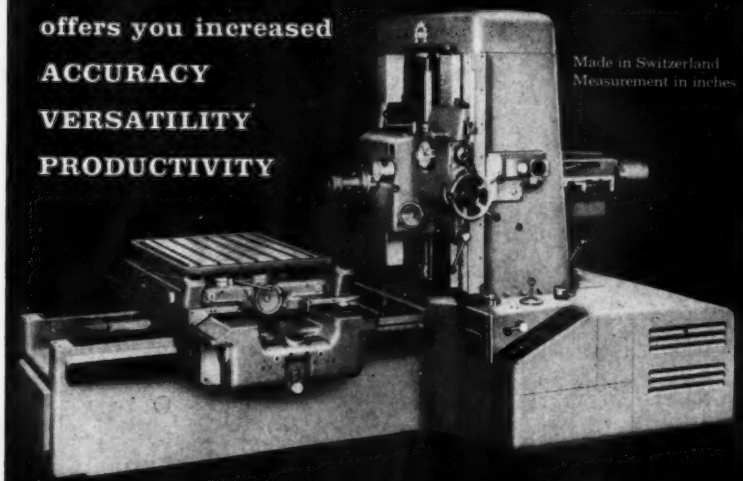

- Automatic positioning can be changed instantly to manual operation
- Projected optical setting — direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference
- Simplified controls functionally arranged for greater operating speed and efficiency
- 3" diameter boring spindle
- Increased capacity: table size 39⅜" x 32"; 29½" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel
- Hydraulic feeds and infinitely variable spindle speeds
- Rear support optional

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York.—Join the long list of leading aircraft and manufacturing plants throughout the United States which are using the horizontal optical jig borer.

Demonstrations upon request at our conveniently located demonstration centers.

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CIRCLE INFORM-A-GRAM KEY NO. 79

The Quick, Easy, Handy Way to TAP BY HAND

. . . Adapts for LATHE USE

THE DAHLSTROM TAP GUIDE virtually eliminates tap breakage—and saves those costly hours spent prying broken taps out of dies. Anyone can use it. Just a few turns of the spindle and the job is done.

Winds through continuously, with no backoff. Work is always dependably straight and square. Fasten it to a post or set it on top of a big job. This handy tapper comes equipped with 9 adapters, 8-32 to ¾" but taps are not furnished. Spindle can be pulled out and used in a lathe, or used as tap extension for hard-to-get-at-places. 18" x 8" x 14", wt. 32 lbs.

Also Makers of Dahlstrom Autostrop and Tap Chuck
Send for bulletin

BRANCH MFG. CO.
16 Olson Drive
NORTH BRANCH, MINN.

$89.50 F.O.B. Factory

Dahlstrom TAP GUIDE

CIRCLE INFORM-A-GRAM KEY NO. 801

NEW...Precise Center Alignment *in less than ½ the time!*

- **End hit or miss center alignment without shifting tailstock or table**
- **Tip adjustment calibrated in increments of .0005"**
- **Provides micrometer control when used for straight or taper work**
- **Ideal when working on shafts or mandrels**
- **Replaceable carbide tip • Saves costly setup time**

With an Enco Micro-Set Adjustable Center, any operator can precisely align his work piece in a matter of minutes. Soon pays for itself in time and scrap savings. Try one and you'll see why they are called *"the most valuable turning or grinding accessory to come along in years"*. Available in popular Morse, Jarno and B&S tapers.

Write for complete catalog and nearest distributor.
Enco also manufactures a complete line of Precision Lathe Turrets and Tiny-Titan Magnetic Base Holders.

Enco MANUFACTURING COMPANY
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CIRCLE INFORM-A-GRAM KEY NO. 802

ANNOUNCING

The new **CRATEX**

TOOL & DIE MAKERS KIT

The world's finest rubberized abrasives for deburring, smoothing and polishing tools, dies, patterns, molds, models, instruments and component parts.

Kit contains 80 wheels and points in the most popular sizes and shapes, equally assorted in four grit textures, coarse (C), medium (M), fine (F), extra fine (XF)... plus four mandrels for ⅛" chuck... packaged in plastic box, compartmented for fast selection. $7.50 complete.

Order your new Cratex Tool & Die Makers Kit #777 through your distributor—or, send your order to us for delivery by the Cratex distributor nearest you.

CRATEX *Free 8-page catalog available on request.*
MANUFACTURING CO., INC.

1600 ROLLINS ROAD, BURLINGAME, CALIFORNIA

CIRCLE INFORM-A-GRAM KEY NO. 803

91

AIR-MITE
PRODUCTION AIR PRESSES

- Any length column
- Any length stroke
- ¼, ½, ¾, 1 Ton capacities
- Special adaptations available

ONE MANUFACTURING SOURCE FOR PNEUMATIC AUTOMATION COMPONENTS

- Cylinders
- Presses
- Valves
- Filters
- Regulators
- Lubricators
- Fittings
- Hose

Air-Mite Production Air Presses are ruggedly built for high production applications. Solid steel column for greater strength and rigidity; compact, powerful cylinders have long, maintenance-free construction features that insure uninterrupted service. Available with a variety of controls for fast, safe operation. Press shown is equipped with two Air-Mite 3-way valves — 1 normally "closed", 1 normally "open." Cylinder will not return for second stroke unless both valves are released.

Write for complete Air-Mite catalog which illustrates and describes the Air-Mite line.

AIR-MITE DEVICES, INC.
4405 W. Kinzie St., Chicago 24, Ill.

CIRCLE INFORM-A-GRAM KEY NO. 804

Catalogs . .

Capacity Coefficients for the Hannifin line of directional air control valves are now included in the new valve finder to make selection easier. Request a valve finder from Hannifin Co., or Circle Inform-A-Gram No. C29.

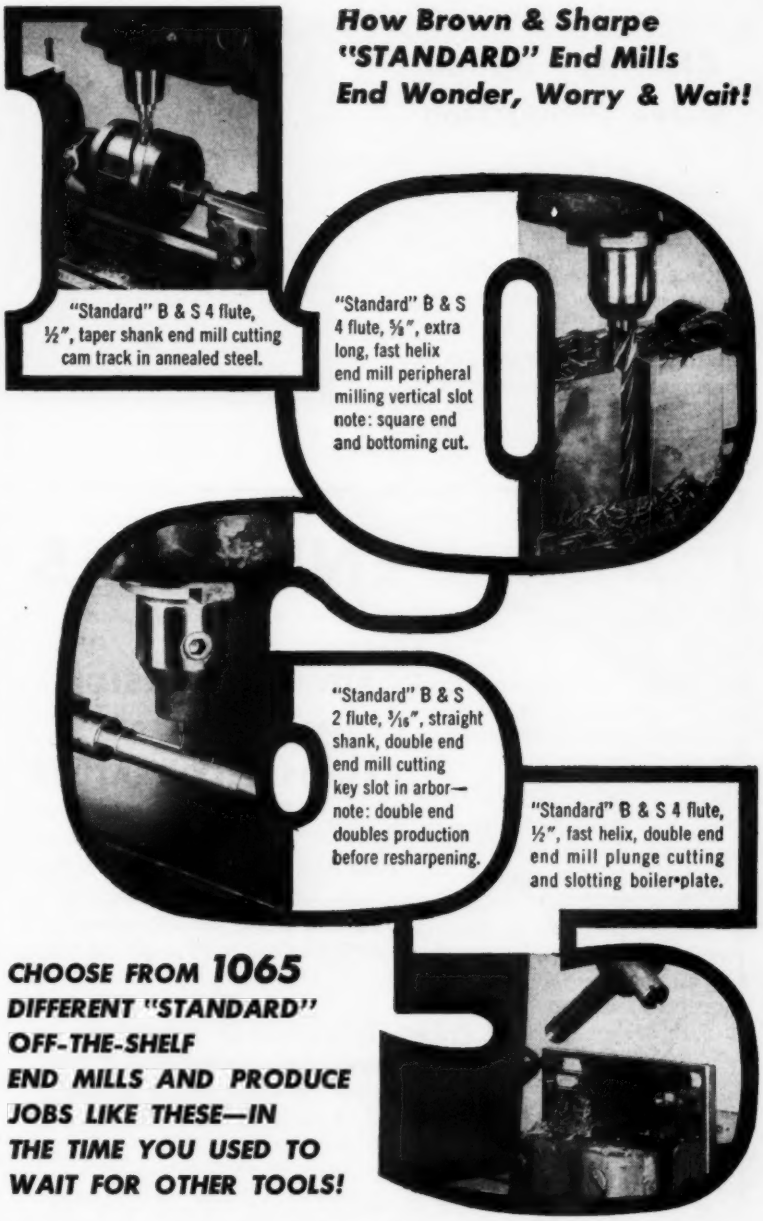
New Carbide Router Bit literature describes standard tungsten carbide router bits for use on aluminum, plastics, and stainless sheets. Dimensions are given for each style. Write Sonnet Tool & Mfg. Co., for your copy, or Circle Inform-A-Gram No. C30.

Pipe-Thread Fittings are described in a bulletin that shows how to solve common problems and gives details on installation. Ask Tru-Seal Div'n, Flick-Reedy Corp., for a copy, or Circle Inform-A-Gram No. C31.

A New Aircraft Drill series is introduced in a bulletin. Advantages, dimensions, and applications are given. Write to Whitman & Barnes for your copy, or Circle Inform-A-Gram No. C32.

Single and Multiple Rivet Setters, air-powered and air-cushioned, are presented in a bulletin. Specifications are given for eight models. Write Chicago Rivet & Machine Co., for your copy, or Circle No. C33.

Keller Power Hack Saws in ten sizes and five capacities are covered in a bulletin. Specifications and advantages are given for every model. Write Sales Service Mfg. Co., for your copy of Bulletin 257, or Circle C34.


How Brown & Sharpe "STANDARD" End Mills End Wonder, Worry & Wait!
"Standard" B & S 4 flute, ½", taper shank end mill cutting cam track in annealed steel.
"Standard" B & S 4 flute, ⅜", extra long, fast helix end mill peripheral milling vertical slot note: square end and bottoming cut.
"Standard" B & S 2 flute, 3/16", straight shank, double end end mill cutting key slot in arbor—note: double end doubles production before resharpening.
"Standard" B & S 4 flute, ½", fast helix, double end end mill plunge cutting and slotting boiler-plate.
CHOOSE FROM 1065 DIFFERENT "STANDARD" OFF-THE-SHELF END MILLS AND PRODUCE JOBS LIKE THESE—IN THE TIME YOU USED TO WAIT FOR OTHER TOOLS!

Here are just a few of the production jobs that are completed and shipped daily—ahead of schedule —by Brown & Sharpe End Mill Users.

Rely on your Brown & Sharpe Distributor for speedy service from a stock of 1065 different end mills.

Send for the B & S "Condensalog" to: **Cutting Tool Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.**

Brown & Sharpe

CUTTING TOOL DIVISION

HIGH SPEED STEEL CUTTERS
NELCO CARBIDE TOOLS
END MILLS

FOR THAT EXTRA EDGE IN PRODUCTION

INDUSTRIAL DISTRIBUTORS · THE RIGHT HAND OF PRODUCTION

CIRCLE INFORM-A-GRAM KEY NO. 81

Chuckers Speed Valve Production

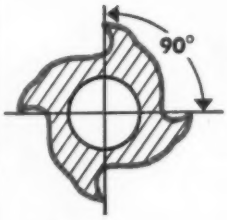
Fourteen operations on complicated steel valve seats are completed in 6 min on a pair of Warner & Swasey chucking automatics at the Cleveland Rock Drill plant, Le Roi Division of Westinghouse Air Brake Co. One automatic chucker machines one

side of the workpiece; the second, the other.

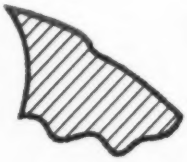
Workpiece material is tough forging quality steel of 72 to 90 Brinell, burned out of plate stock to form rough blanks. Carbide and high speed steel tools are used for drilling, boring, facing, radius forming, relief cutting, chamfering, and forming angles.

A special trepanning arrangement is used to cut a circular groove in one face of the blank, holding a tolerance of ±0.003" on the diameter and ±0.005" on depth. A parallel limit of ±0.003" also is achieved in facing operations.

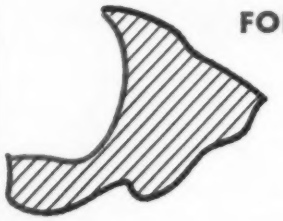
Eclipse END MILLS
OF
ADVANCED DESIGN
(AT NO EXTRA COST)
EXCLUSIVELY FEATURE



ACCURATE FLUTE INDEX
plus constant helix producing end mills having balanced cutting power which permits INCREASED RATE OF FEEDS



FORM RELIEVED LANDS
providing a strengthened keen cutting edge which means LONGER TOOL LIFE



FORM CUTTING FACE (HOOK)
permitting chips to flow freely reducing heat in cut which means FINE SMOOTH FINISHES

Write for Eclipse Catalog E 58 M

Economize With Eclipse

ECLIPSE COUNTERBORE COMPANY
END MILL DIVISION DETROIT 20, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 82

BOOK REVIEW

PURCHASING HANDBOOK, edited by George W. Aljian. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N.Y., 1958. 1388 pages, $15.

Organization, management, and procedures for purchasing departments are thoroughly covered in this comprehensive handbook, prepared by 220 specialists in the field. Principles and methods are presented on such subjects as the purchasing routine, rating of vendors, buying economically, and control of inventory. Other topics include basic price considerations involved in any purchase, "make or buy," and how to reduce costs of materials, supplies, and services. The examples of forms, contracts, reports, and manuals add to the value of this survey of purchasing.

ANNOUNCING . . . for January 1960 Publication

Manual of
MACHINABILITY AND TOOL EVALUATION

Especially When Turning Steel with Carbide

by *Antoni Niedzwiedzki*
Machining Consultant
Detroit, Michigan

A Treatise Built Upon Advanced European and American Concepts and Theories, and Results of the Author's Own Experimentation and Practical Experience in Engineering and Machine Shop.

This newest publication in its field has been reviewed and edited by

H. J. Siekmann, Manager
Market Development and Research
Metallurgical Products Department
General Electric Company
Detroit, Michigan

In the "Editor's Foreword," Mr. Siekmann says: ". . . An increasing number of interesting papers and articles of European, Russian and English origin are finding their way into American publications. If we are to be in a position to properly evaluate this information we must become more familiar with European methods of presenting metal cutting data.

". . . . A further advantage to reviewing and becoming familiar with European work of long but little-known standing here in America is that it may save us the expense and effort of 're-inventing the wheel' too many times.

TYPICAL CHAPTER COVERAGE

Tool Life Formulas - - - Tool Life Criterion - - - Chip Load and Workpiece Hardness - - - Tool Geometry - - - Test Records - - - Tool Inspection - - - Machinability Classification - - - Machine Tool Selection.

* * * *

The Manual contains a wealth of examples and forms for Development Sheets - - Recommendation Sheets - - Crossed Charts - - Tool Life Tables - - Graphs and Drawings - - covering work with Carbides and HSS on Cast Iron and Steel.

". . . . This work by Antoni Niedzwiedzki is a presentation of thoughts on metal cutting from many centers of technological activity: Polish, Czech, German, Russian, French, Belgian, Swiss, English, Italian, Canadian, and finally the United States. The basic concepts put forth by these groups have all been absorbed, evaluated, and analyzed by Mr. Niedzwiedzki and have been combined with the results of his own experiments, calculations and observations to form the overall approach he has presented in this publication.

". . . . I would like to point out that I have not made any discernible technical contributions to Mr. Niedzwiedzki's writings aside from a normal exchange of ideas arriving from mutual conversation and consultation. . . . I only hope that my limited changes from European English to American English may be successful in more clearly presenting Antoni Niedzwiedzki's interesting and thought-provoking work to American Industry."

Place your order now and it will be filled at the pre-publication price of $5.00* per copy. Price after publication will be $6.00* per copy.

HUEBNER PUBLICATIONS, INC.
P. O. BOX 3505, 1975 LEE ROAD
CLEVELAND 18, OHIO

Gentlemen: Please ship as soon as available _____ copies of MACHINABILITY AND TOOL EVALUATION at the special pre-publication price of $5.00* per copy.

(Note: price will be $6.00* per copy if order is received after publication.)

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Open account shipments on purchase orders of rated companies. Otherwise, check with order, please. No C.O.D.'s.

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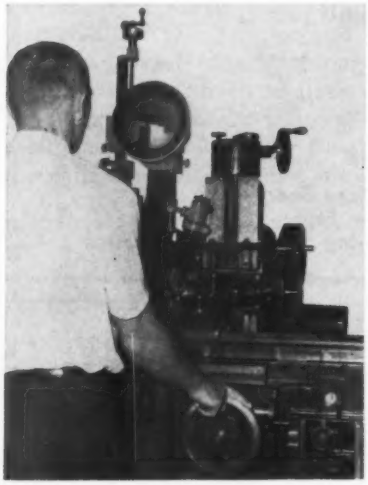
Product News

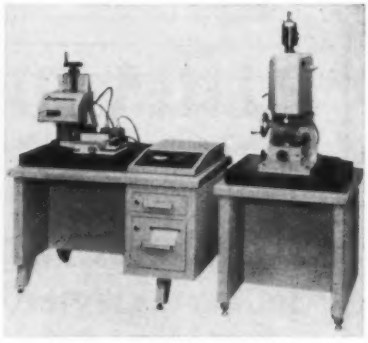
Close-Up Checking



A new portable optical projector which may be attached to a variety of machine tools, allows continuous precise magnified checking, direct measurement, and comparison of work contours in transparent overlay charts. It's best for circular and flat form tool grinding, production grinding of precision contours, and tool regrinding. Get details from Stocker & Yale, Marblehead, Mass., or Circle Inform-A-Gram No. P1.

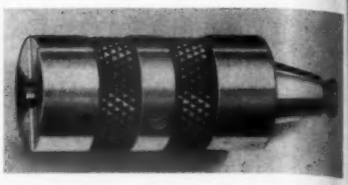
Record Surface Flaws

Here's a mechanical-electronic instrument, the Rotary Proficorder, for research, experimentation, and production that provides a permanent magnified chart record of the shape, height, and spacing of all surface irregularities. Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich., provides information, or Circle Inform-A-Gram No. P2.

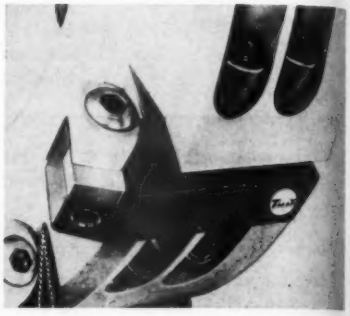


Flush Pin Gage

Accurate and easy in-process inspection, as well as final inspection, of port contours after machining is easily done with this new flush pin gage. It's made of corrosion-resistant stainless steel and is available for all 13 sizes of each specification. Request details from Sonnet Tool & Mfg. Co., 576 N. Prairie Ave., Hawthorne, Calif., or Circle No. P3.



Easy Insert Indexing



This new type milling cutter blade holder for disposable inserts cuts downtime by providing an accessible clamp locking screw. Coromant T-Max 270 1-1822 has the screw in an easy-to-see-and-reach position on the outside periphery of the milling cutter. Contact Sandvik Steel Inc., 1702 Nevins Rd., Fair Lawn, N.J., for details, or Circle Inform-A-Gram No. P4.

Drill Any-Shaped Hole with No Heat or Tool Wear

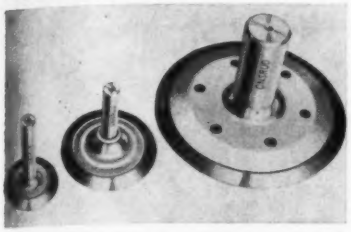
Drill holes or sink cavities of any shape into even difficult-to-machine metals with the new Anocut electrolytic cavity sinking machines. Round, square, or any other shaped holes are formed by an electrochemical action between an electrode (tool) and workpiece.

Material is removed without heat or tool wear. With 300 to 3000 amp power units, the cavity sinking machines in the new line can remove 0.030" to 0.300" cu. in./min. Concentration of 0.100 cu. in./min removal rate over a 1-sq.-in. work area permits fast penetration rates for fast production. Actual electrode penetration rates depend on type of work, material, configuration, etc.

The machine can easily produce a 30 to 40 micro-inch finish on many materials and better than a 20 micro-inch finish on tough super alloys. Normal accuracy is from 0.001" to 0.002". For details, write Anocut Engineering Co., 631 W. Washington Blvd., Chicago 6, or Circle Inform-A-Gram No. P5.

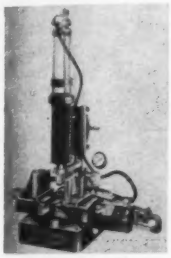
Product News

Machines Honeycomb Core



A new circular milling cutter is a replaceable ring type and utilizes a method of mechanically holding a solid carbide ring to the cutter body. Available in 1" to 8" cutting diameters from Onsrud Cutter Mfg. Co., Inc., 800 East Broadway, Libertyville, Ill., or Circle Inform-A-Gram No. P6.

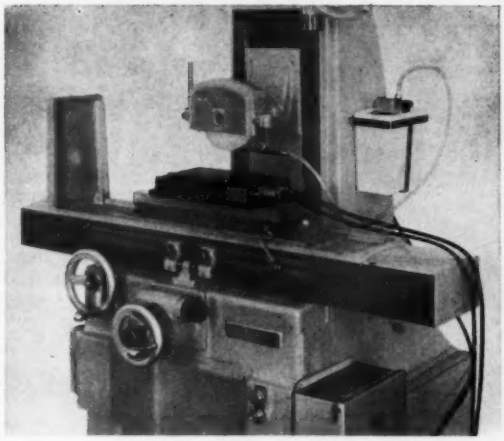
Automated Marking



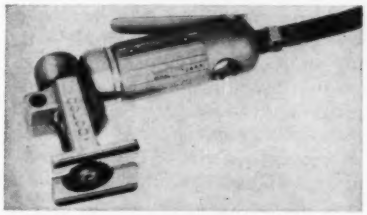
Efficient production marking of steel parts or nameplates is handled by Pneumark Model 10T impact bench press. It features setup without downtime for further adjustment, safe fully-automatic operation, and 3000 to 3600 pcs/hr production rate. Geo. T. Schmidt, Inc., 4112 N. Ravenswood Ave., Chicago 13, or Circle No. P7.

Ideal for continuous work requiring clutch engagement and disengagement at every press stroke is this modernized Series A inclinable press. The solid casting of the slide was brought forward for more solid backing for the dies, and the flat surfaces on the front and sides simplify fitting feed roll lifters and other attachments. Ask for Bulletin 58N from Niagara Machine & Tool Works, Buffalo 11, N. Y., or Circle No. P8.

Small Chucking System



New Rivet Trimmer

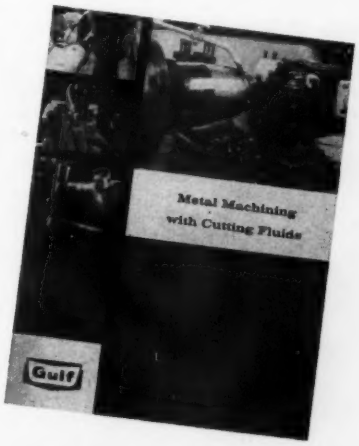


This new blind rivet trimmer attachment is for use with Dotco Model 1AE right-angle drive air tools. It assures accurate cutting, cuts trimming time, and trims the rivet stem square, saving time in later shaving operations. Details are available from Doeden Tool Corp., Sherwood, Ohio, or Circle Inform-A-Gram No. P9.

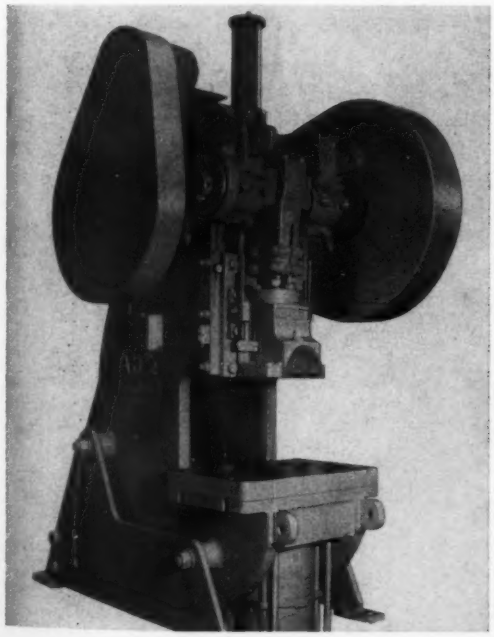
Metal Machining Guide

In selecting a cutting fluid to fit a particular job, the basic machining factors to be considered are the material, operation, and the tools. A new 115-page booklet, "Metal Machining with Cutting Fluids" is a comprehensive study of these factors and your guide to smoother machining.

Information about material structure, treatment, and composition; differences and advantages of machining operations; tool material,



quality, dimension, and shape; and characteristics, use, and handling of cutting fluids is clearly explained and illustrated. Detailed diagrams show many grinding operations and the appendix contains charts on the chemical composition of various steels and alloys, cutting feeds and speeds for different machines; machinability rating tables; and other valuable data. To get your copy write on your company letterhead to Gulf Oil Corp., Dept. DM, P. O. Box 1166, Pittsburgh 19, Pa. P11.



Modernized OBI Presses

Use a small production model of a new electrostatic chucking system for a precision surface chucking of non-magnetic metals and non-conductors. The inexpensive unit, with 5" x 8" work-holding surface, is ideal for experimental shops, toolrooms, and for short-run production. Bulletin available from Electroforce Inc., Fairfield, Conn., or Circle Inform-A-Gram No. P10.

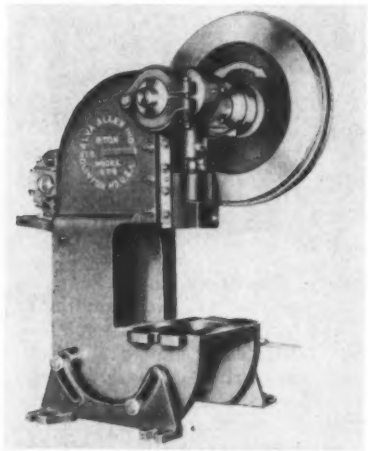
Product News

Measures Bores

This internal comparator, the Intramess, is automatically centered in the bore and permits measurements accurate to 0.000050" for checking of size, out-of-roundness, bellmouth, taper, and other irregularities. Write for a folder to Mahr Gage Co. Inc., 274 Lafayette St., New York 12, or Circle Inform-A-Gram No. P12.

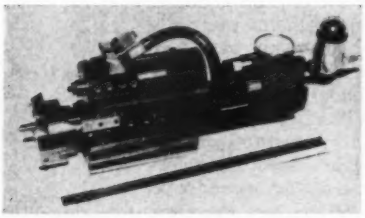
New 8-Ton Punch Press

This new BT-8 Model press is available with extra large 8½" shut height and 10" throat for very large parts. Standard die space is 7" shut height and 5" throat. Blanking,



forming, shearing, riveting, and cutting, can be handled and repeat or non-repeat action is possible. Alva Allen Industries, 1001-15 N. 3rd St., Clinton, Mo., or Circle Inform-A-Gram No. P13.

Face-Mill Accurately



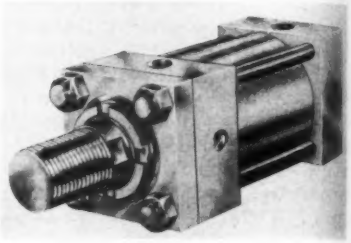
This Luft face milling unit can mill, face, counterbore, etc. in any position and is especially good for large pieces, that can be done in 3" to 5" dia. Can be mounted to any job. Get information from Automation Tools Inc., Box 331, La Jolla, Calif., or Circle No. P14.

New Cutting Oil

Maximum stability in cutting of soft alloys like aluminum, stainless steel and copper, is provided by a new premium quality soluble cutting oil. AL-HD provides longer tool life, less downtime, and fewer sharpenings and dressings. Shear-Speed Chemical Products, 7125 E. McNichols Rd., Detroit 12, or Circle Inform-A-Gram No. P15.

Interchangeable Cylinders

Maximum flexibility of installation and smoother more precise power are features of the new hydraulic cylinders. They have a 1⅛" bore size, in a range of 12, through 12". Request details from The S-P Mfg. Corp., 30201 Aurora Rd., Solon, Ohio, or Circle No. P16.

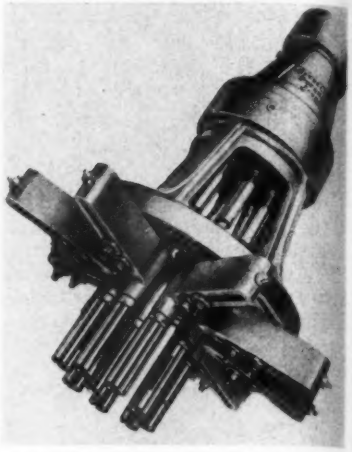


Automatic Molding

A newly designed line of automatic transfer and compression plastic molding machine features top and bottom hydraulic ejection systems, and positive air "hold down" or "hold up" to keep parts in desired portion of the mold. The pre-heater loader feeds a controlled number of preforms to the transfer pot on any 100, 150, 200, and 300 ton available units. For information, write Rodgers Hydraulic Inc., 7401 Walker St., Minneapolis 26, or Circle Inform-A-Gram No. P17.

HD Drill Head

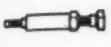
The addition of a heavy-duty multiple drill head to its line has been announced by Cleveland Pneumatic Industries, Industrial Sales Div'n, 64

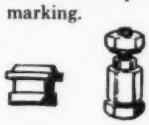


Old Orchard, Skokie, Ill. The Hercules Model 98-X is designed for extra-heavy duty and offers a capacity of nine 1/2" taps in mild steel. Write the company for Data Sheet 5120, or Circle No. P18.

WANT TO MARK *Something?*

Matthews Versatile Multi-Purpose Machines are interchangeable for round or flat part marking.





Model 2126: Hydra-Pneumatic, up to 12,000 lbs. marking pressure. Roll marking action. Takes parts up to 6" diameter.

Model 2077: Full Pneumatic, marking table adjustable up to 36" work space. Up to 7,500 lbs. marking pressure.

HEAVY DUTY MODEL

Model 2178: Hydraulic action, up to 24,000 lbs. marking pressure. Adjustable to wide variety of operations.

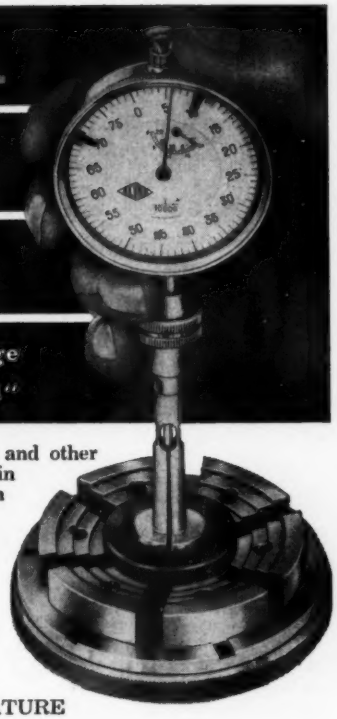
All Multi-Purpose machines use flat or roller dies interchangeably. Holders and type available where marking changeover is frequent.

Write for details, stating your marking requirements.

JAS. H. MATTHEWS & CO.
3962 FORBES AVENUE
PITTSBURGH 13, PA.

CIRCLE INFORM-A-GRAM KEY NO. 871

ALINA BORE TEST



High Precision Small Bore Gage
Dial Graduated to Read .0001"

Indicates taper, bell mouth, out-of-round and other dimensional variations of bores ranging in size from **.057" thru .810".** ■ Simple design and rugged construction are combined to provide a reliable instrument that will always repeat. ■ 3 sets cover complete range; each set fully equipped with rings and measuring heads. ■ 2 different holders are available for production applications.

ALINA WRITE FOR LITERATURE

ALINA CORPORATION
122 East Second St., Mineola, L.I., N.Y.

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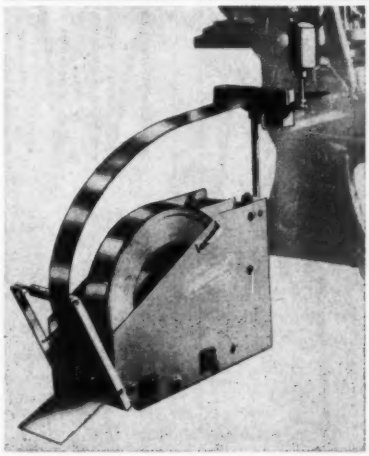

HERE'S AUTOMATION for YOUR PRESSES

Automation for your press room is easily achieved through use of a "Poweroll" Coil Cradle-"Clean-Oiler" combination, a press equipped with an automatic feed and a die having a built-in scrap chopper, to form a completely automatic high production machine. Get maximum production by using this compact cradle-oiler unit. It can easily be moved from one press to another as needed, and can be loaded without a crane. Prices start at $325.00. Capacities available to 24" width, to 54" O.D., and to 4,000 lb. weight.

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Some Territories Open

THE MEDELTON CO., INC.
335 E. 142nd St., Bronx 54, N. Y.

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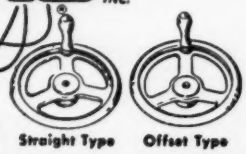
TOMCO INC.



HAND WHEELS Straight Type Offset Type

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- HAND KNOBS
- MACHINE HANDLES
- HANDLES
- BALL HANDLES
- LEVERS
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GRADUATED DIALS

SPECIFY TOMCO FOR DEPENDABILITY

A Complete line of high grade hand knobs, levers, handles, hand wheels, graduated dials is available for immediate shipment from stock of standard items. Specialty items made to your specifications.

WRITE FOR INFORMATION

TOMCO INC.
RACINE 2, WIS.

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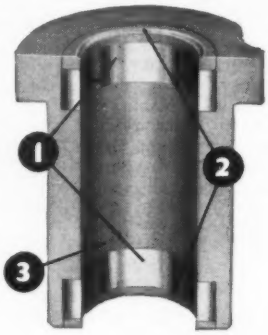
CARBIDE INSERTED MEYCO BUSHINGS Can Cut Production Costs!

MEYCO carbide inserted drill jig bushings have been successfully saving money on production runs for the past decade. Performance: same as solid carbide, but need not be handled with kid gloves. Greater economy, because of long life at less cost. You can enjoy the advantages of greater accuracy for a longer time, less spoilage, less machine down-time, added drill and jig life with MEYCO carbide inserted drill jig bushings. Get the full story now: write for new Bushing Catalog No. 41



*PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

W. F. MEYERS CO., INC., BEDFORD, IND.

CIRCLE INFORM-A-GRAM KEY NO. 881

SIX ADVANTAGES OF MEIER WEARITE EXTRUDED ALUMINUM BRONZE RECTANGLES

for wear strips and wear plates

LENGTH: MEIER WEARITE is available in any length up to 10 feet.

AVAILABILITY: WEARITE comes right off the shelf of your local distributor... no waiting time for sizes now in stock.

SIZE: 94 different rectangular sizes 1/4" to 3" thick and 1" to 6" wide.

QUALITY: WEARITE is produced under strict laboratory controls. Tough (210–307 Brinell); strong (105,000 psi ultimate yield); and smooth surfaces with excellent wear characteristics.

MACHINING: Extruded WEARITE is free from porosity, and inclusions and has a homogenous structure, improving machineability.

COST: MEIER WEARITE COSTS LESS in pound for pound of usable metal than cast wear strips.

Write for technical folder or test sample at no cost.

Meier BRASS & ALUMINUM Company

1471 E. NINE MILE RD.
HAZEL PARK, MICHIGAN

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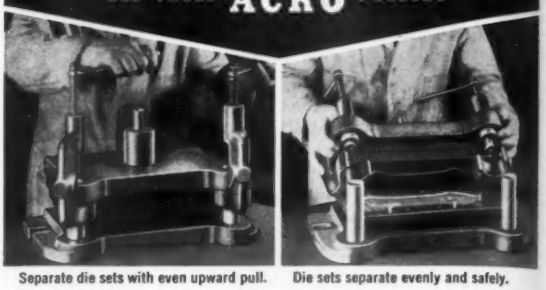
FOR EASY, FAST UNIFORM SEPARATION OF DIE SETS...

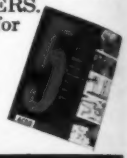
USE THESE **ACRO** PULLERS



Separate die sets with even upward pull. Die sets separate evenly and safely.

When you have die set pullers that remove the punch holder from the die shoe by a straight upward pull and the punch holder slides upward from the die shoe simultaneously and safely from both leader pins, you have Acro Die Set Pullers and you're saving time.

If you're not, this is how it's done with Acro Pullers: *Indexed* screw wrenches act as indicators, controlling the upward travel. This is an exclusive patented Acro feature and found only in ACRO DIE SET PULLERS. It may pay you to investigate. Write for further free information today.

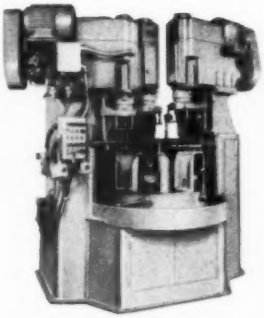


OTHER* ACRO *TIME SAVERS FOR YOUR SHOP include Acroflex, drill rod racks, leader pin oilers and wing nuts. Write for complete descriptive folder. Ask for bulletin TP59.

ACRO METAL STAMPING COMPANY
3387 E. Reservoir Ave., Milwaukee, Wis.

CIRCLE INFORM-A-GRAM KEY NO. 882

NEW KAUFMAN MODEL 10E-1125 TAPPING MACHINE



- For drilling, countersinking and tapping a wide variety of flanged valve bodies.
- Three-head machine provided with 7½ h.p. standard head units, four-spindle adjustable heads and five-division index.
- Head units provided with six-speed transmission, hydraulically operated adjustable feed, rapid advance and adjustable time delay at bottom of stroke.

Kaufman's new Model 10E-1125 handles a large range of flanged bodies with different diameter of drills, countersinks and taps on a variety of bolt circles—for example: four holes are completed in part at one time. Whether you need Model 10E-1125 or a machine with standard drilling or tapping head units, or a machine for a new, unusual job—write or telephone Kaufman today!

KAUFMAN

KAUFMAN MFG. CO.
529 S. 29th Street Manitowoc, Wisconsin

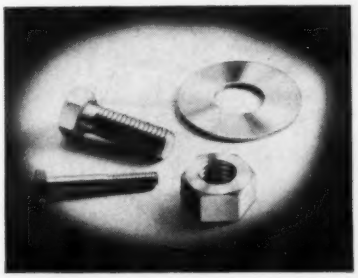
CIRCLE INFORM-A-GRAM KEY NO. 884

Small Parts Comparator

For rapid inspection of mass produced parts use the Wilder small parts comparator that has stage and screen conveniently placed for maximum speed and comfort in inspection. Write for Catalog 357 from Opto-Metric Tools Inc., 137 Varick St., New York 13, or Circle No. P19.

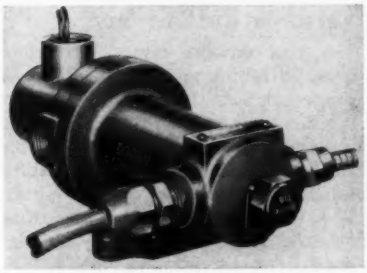
Special Titanium Bolts

New titanium bolts, nuts, and washers are now being manufactured to exact tolerances and rigid specifications by customer order by Star Stainless Screw. Many thousands of different types and sizes of fasteners are available in stainless steel, brass, and other alloys. Get information from Star Stainless Screw Co., 699 Union Blvd., Paterson 2, N.J., or Circle Inform-A-Gram No. P20.

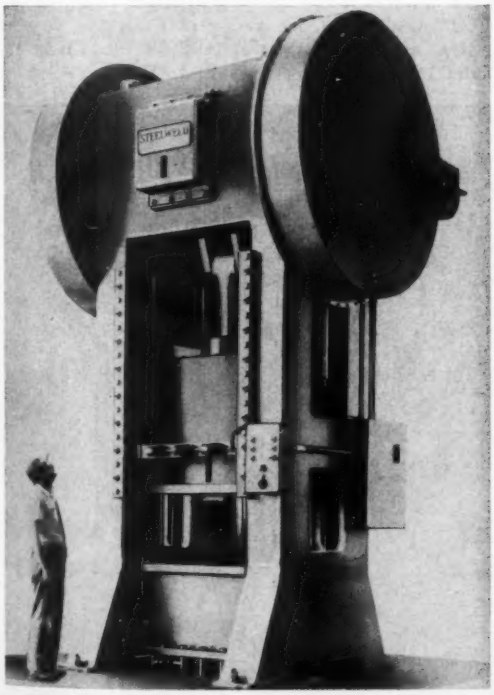


Automatic Lubricant Dispenser

This new multi-purpose unit dispenses oils, light grease, soaps, and tap lubricants; eliminates oil cans and daubers; provides positive fluid

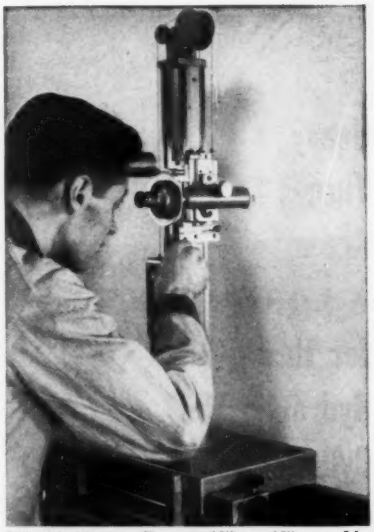


ejection; and assures accurate volume adjustment. Bulletin available from Logansport Machine Co., Inc., Logandsport, Ind., Circle Inform-A-Gram No. P21.



High Speed Draw Press

The special design of this Speed-Draw press steps up operating speed over standard mechanical presses by 80%. It's ideal for deep-draw applications and permits making extra long draws at high speeds. It reduces the number of operations required to form a part and permits operations usually impossible on a press. The Steelweld Machinery Div'n., The Cleveland Crane & Engineering Co., Wickliffe, Ohio, or Circle Inform-A-Gram No. P22.



M1238-1818 — *Range 18" x 18", working distance 9" to infinity. Reads to 0.001" up to 24" working distance. Protractor ocular reads to 3 minutes of arc. Image is erect.*

Cut inspection time in half

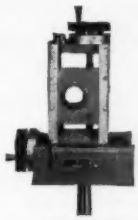
with new Gaertner Coordinate Cathetometers

These convenient, reliable optical instruments permit making precise coordinate measurements in a vertical plane. The two dimensions are measured with one setting, object does not have to be rotated. Inspection time is cut in half and resetting errors eliminated.

Versatile Gaertner Coordinate Cathetometers are ideally suited for precision measurements on large objects; also objects or points in recessed, remote, or inaccessible locations. Applications include measuring jet engine sections, complicated castings, printed circuits, bolt holes and bosses on large piece parts, traces on cathode ray tubes, etc.

Because these are optical rather than mechanical measuring instruments, you make non-destructive measurements without contact, distortion, or concern about pressure being applied to the object when making a setting. Instruments available in English or Metric system.

M1236-46— Horizontal range 6", vertical range 4". Reads to 0.0001", working distance 5" to infinity.



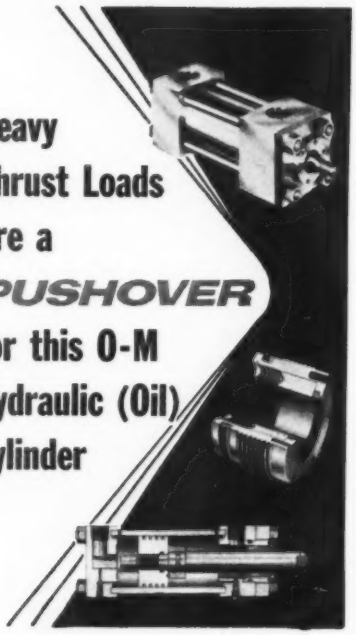
M1236-22— Range 2" x 2", reads to 0.0001". Working distance 5" to infinity. Shown with 19 mm mounting rod, and without telemicroscope. Instrument permits precise coordinate movement of other objects such as photo cells, probes, etc., in place of telemicroscope.

Write for Bulletin 188-53 & 194-57

The Gaertner Scientific Corporation

1242 Wrightwood Ave., Chicago 14, Ill.
Telephone: BUckingham 1-5335

CIRCLE INFORM-A-GRAM KEY NO. 891



Heavy Thrust Loads Are a *PUSHOVER* for this O-M Hydraulic (Oil) Cylinder

SERIES TH
2000 psi Operation
3000 Non-Shock
Available in 1½″ to 8″ bores
Meets JIC Standards

MANY construction, design and engineering advantages contribute to the power-loaded thrusts of this heavy-duty O-M component. It is ruggedly constructed—all steel and bearing bronze. It is designed right to seal right against power loss. The large ports conduct an unrestricted flow of fluid to the piston, assuring full power. Cushion ball check valve provides for full power starts of return strokes.

The high tensile steel, chrome-plated, standard or oversize, piston rods have a high yield point for higher load capacity. And the rod gland cartridge, threaded for easy removal, is piloted in rod head to assure perfect alignment undisturbed by heavy load stresses. In most installations, cartridge can be removed without removing mounts or tie-rod nuts. A complete selection of mounts is available.

Detailed information about these and other advancements is contained in our latest Bulletin No. 105. Mail coupon below *TODAY* for your copy or consult your local O-M representative.

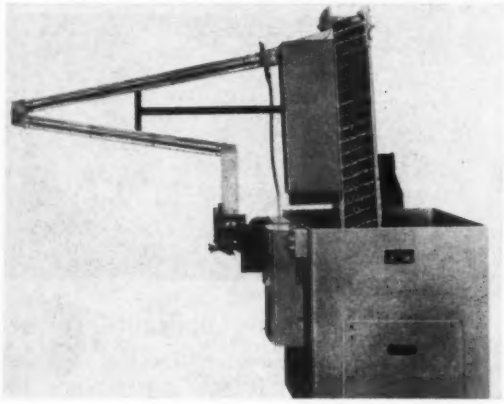
ORTMAN-MILLER MACHINE CO.
21 143rd Street, Hammond, Ind.
☐ have representative call
☐ Send Bulletin 105

Name_____ Position_____
Company_____
Address_____
City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 901

Product News

New Transfer Mechanism

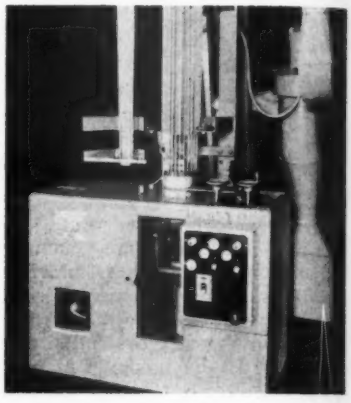


The Model 4000 elevating hopper feed now features a transfer mechanism to change the position of rolling parts. This equipment is used when parts must be changed from a rolling to an end-to-end roll position. Up to 400 pcs/min can be handled. Production Feeder Corp., 3130 Johnnycake Rd., Mentor, Ohio, or Circle Inform-A-Gram No. P24.

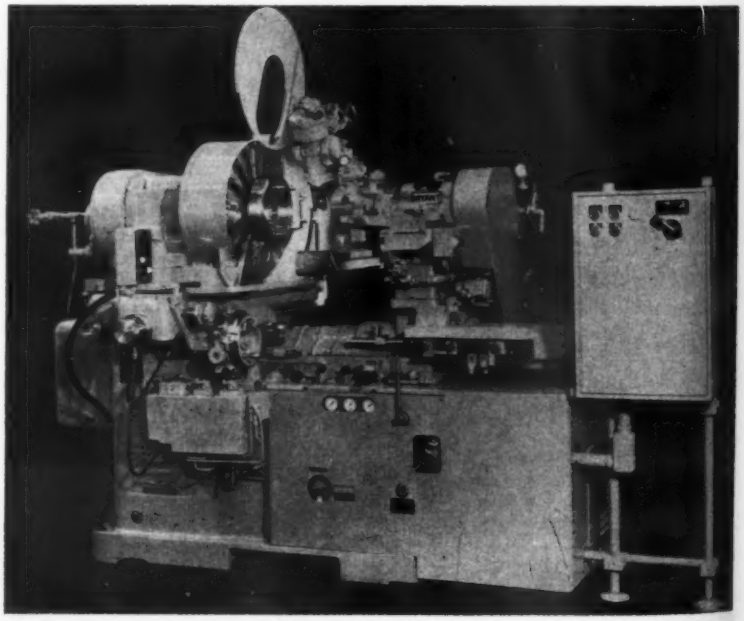
Versatile Cut-Off Saw

A new cut-off saw cuts various types of tubing and solids in various shapes at least 10 times faster than regular high speed machines. It has a maximum production rate of from 100,000 pcs/hr for 3/16″ dia tubing to 25,000 pcs/hr for 1″ dia tubing. The National Copper & Smelting Co., Cleveland 6, or Circle Inform-A-Gram No. P23.

Handy Internal Grinder



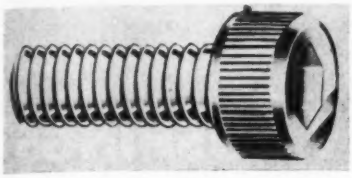
This versatile internal grinder is for grinding roller bearing and ball bearing raceways in outer bearing races and straight bores in inner bearing races from 1″ to 20″ dia. Change-over is done easily and quickly. Get details on Model 1124-JY from Bryant Chucking Grinder Co., Springfield, Vt., or Circle Inform-A-Gram No. P25.



Product News

Socket Cap Screws

Extra strength that can be re-applied many times and ideal grain flow to take greater tightening torques are features of the new Set-ko cold forged stainless steel socket



cap screws. They also provide clean chip-free sockets for easier, faster driving and have rolled threads for perfect fit. Write for information to Set Screw & Mfg. Co., Bartlett, Ill., or Circle Inform-A-Gram No. P26.

Heavy Duty Engine Lathe

The new extra heavy-duty high-speed engine lathe comes in three models and with swings over the bed of 40½", 45½" and 49". Model 4025 features 36-speed headstock, overall speed ratio of 160:1, and opposed helix final drive gears. The Sidney Machine Tool Co., Sidney, Ohio, or Circle No. P27.

Drill Point Grinder

For grinding conventional, formed, or split points on a high precision, high production basis use the new drill point grinder. It features a V-

rest drill holder that securely holds and positions each drill for grinding. Morse Twist Drill and Machine Co., New Bedford, Mass. or Circle Inform-A-Gram No. P28.

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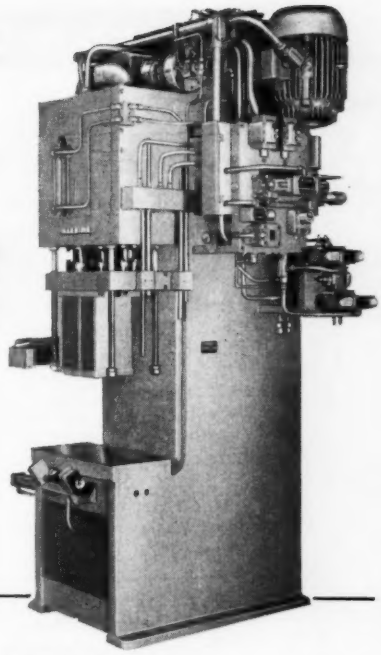

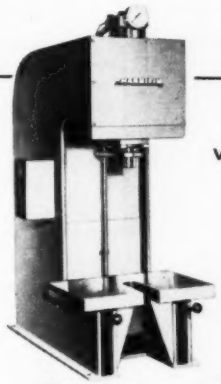

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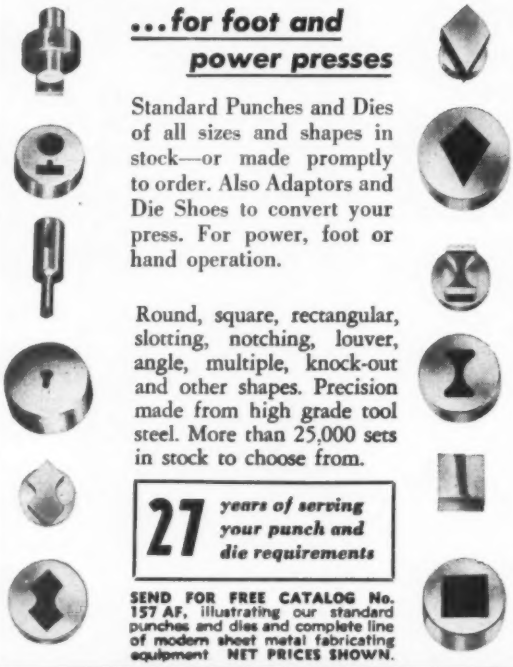
Punches and Dies



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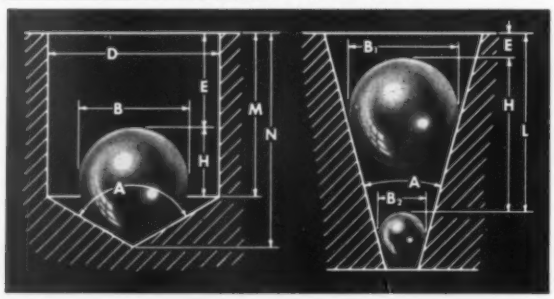

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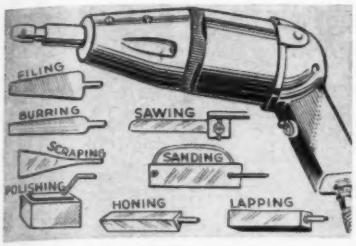
Portable Electric Tool



This new portable electric reciprocating tool now features sealed-in lubrication and is used for filing, burring, sawing, honing, lapping, and polishing. It incorporates sealed bearings, oilless bushings, delivers 1/8" or 3/8" fixed stroke at 1000 spm, and operates on 110 volts ac-dc. Get bulletin from Acme Tool Corp., 71 W. Broadway, New York 7, or Circle Inform-A-Gram No. P29.

New Plastics Mold Product

A standard ejector sleeve eliminates the expensive drilling and honing operations formerly required to make ejector sleeves for plastic

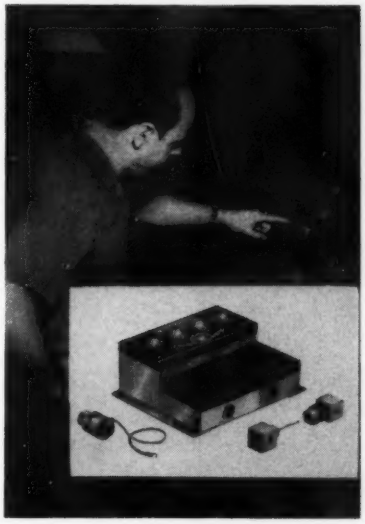
molds. It's available in seven standard diameters and comes in 4", 6", 8", and 10" lengths. Detroit Mold Engineering Co., 6686 E. McNichols Rd., Detroit 12, or Circle Inform-A-Gram No. P-30.

Hydraulic Valves

For relief, sequence, unloading, reducing, and counterbalance functions in a hydraulic circuit, use the new line of 3000 psi pressure-controlled hydraulic valves. Series 8800 is available in three basic sizes. Catalog 230 shows applications. Rivett, Inc., Brighton 35, Boston, or Circle Inform-A-Gram No. P31.

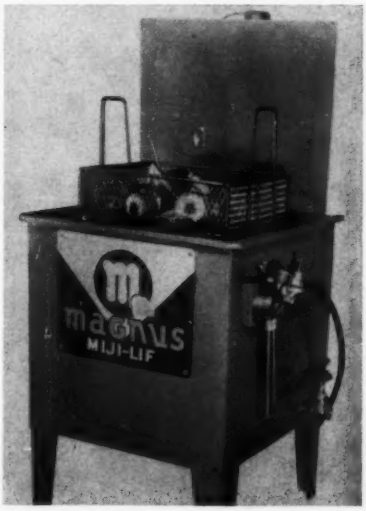
Speed Plastic Molding

A new electronic control unit automatically stops an injection molding machine from applying clamping pressure when dies are not closing properly. Circuit-Master Automold protects molds and reduces downtime and material waste without slowing molding cycle. Information supplied by Wintriss, Inc., 20 Vandam St., New York 13, or Circle Inform-A-Gram No. P32.



Removes Cyanide Salts

Removal of sodium cyanide salts and quenching oils without dangerous hot cyanide solutions is now possible. With Magnus 61-DRX cleaning compound and Miji-Lif stock agitating cleaning machine, steel castings, stampings, and screw parts are cleaned in one operation. Magnus Chemical Co., Inc., Dept. T&P, South Ave., Garwood, N.J., or Circle Inform-A-Gram No. P33.



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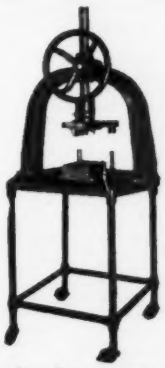

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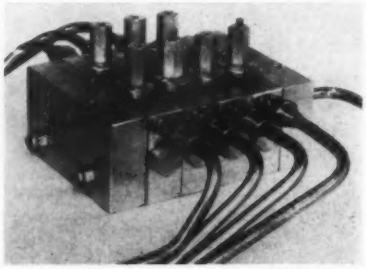
CIRCLE INFORM-A-GRAM KEY NO. 945

Product News

Trouble Indicator

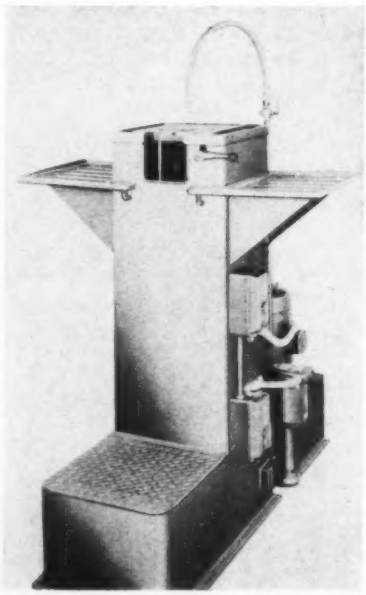
Pinpoint blockage in automatic lube systems with this new indicator for progressive type centralized oil and grease systems. When a



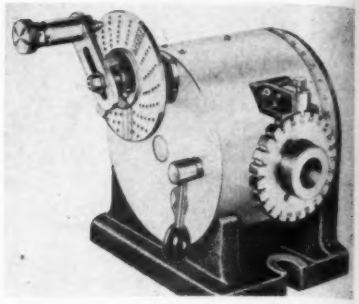
blocked condition is cleared, the indicator pin automatically returns to normal position. Range of sizes available from Trabon Engineering Corp., Solon, Ohio, or Circle Inform-A-Gram No. P34.

Low-Cost Broach

A new vertical table top broaching machine is ideal for custom tool and die shops and high production. Model VM215-3 performs many internal broaching applications, such as keyways, square, oblong, and splined or round holes, and surface broaching with the combination work-holding broach guide fixture. It has a 15" cutting stroke and 9 sfpm cutting speed. Write for a bulletin to Pioneer Broach Co., 6434 Telegraph Rd., Los Angeles 22, Calif., or Circle Inform-A-Gram No. P35.



Direct Indexing

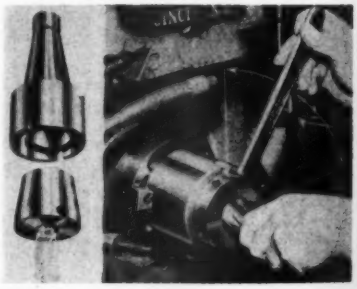


Changing from conventional indexing to direct indexing can be done in less than a minute with the direct indexing heads now available for L-W Chuck dividing heads. Worm and wheel adjustment eliminates back lash. A 24-slotted plate is standard equipment with direct indexing models. L-W Chuck Co., 72 S. St. Clair St., Toledo 4, Ohio, or Circle Inform-A-Gram No. P36.

Adjustable Nozzle

Only one moving part provides for ease, speed, and economy in maintenance of a new adjustable-discharge atomizing nozzle. Simple adjustment gives precise control over a quantity of flow, size, and shape of spray pattern. Good for coolants. Get details of Model 2000 from Calco, 81 E. State St., Columbus 15, Ohio, or Circle Inform-A-Gram No. P37.

Faster Tool Changes

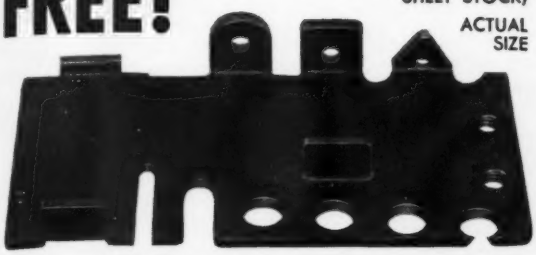


Machine tool downtime and man hours for tool changing are drastically reduced with this new solid collet adapter. It repositions both left and right hand tools within 0.0005" of indicator settings by joining matching high precision internal and external tapers. Chi-Co, Inc., Ledge Rd., Northfield, Ohio, or Circle Inform-A-Gram No. P38.

FREE!

(SAE 1010-3/32" CRS—SHEET STOCK)

ACTUAL SIZE



Short-Run Design Suggestion Sample

ENGINEERS responsible for the design function will welcome this practical short-run stamping sample which *visibly* shows various common conditions that occur in metal fabrication.

An actual production sample, it indicates typical mechanical problems met with in terms of type of material, temper and thickness.

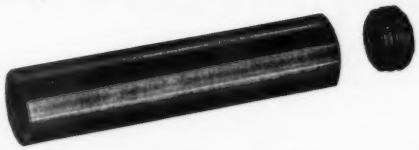
REQUEST SAMPLE AND BULLETIN DDS-2 ON YOUR LETTERHEAD

DAYTON ROGERS *Manufacturing Company*

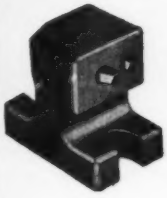
MINNEAPOLIS 7B, MINNESOTA

CIRCLE INFORM-A-GRAM KEY NO. 951

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!



One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.



The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:
3/16, ¼, 5/16, ⅜, 7/16, ½, ⅝, ¾, 1"

Write for Literature

STURDY BROACHING SERVICE, INC.
23516 TELEGRAPH RD., SOUTHFIELD, MICH.

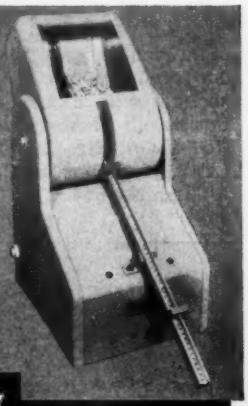
CIRCLE INFORM-A-GRAM KEY NO. 952

HOPPERAL

something NEW in small parts feeders

SINGLE TRACK

Orients and releases one or more parts in a single, smooth, sliding motion. Lifts part to track with a minimum of vibration or tumbling action. Fast, versatile, self-contained

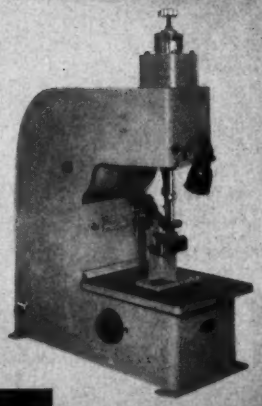


MULTIPLE TRACK

Available with any number of tracks to feed parts to assemblies or other operations where a large quantity of parts is required simultaneously. Can be partitioned and supplied with properly designed tracks to feed unlike parts

HOPPERAL DRIVER

Can be equipped to drive small nails, drive screws, pins, rivets, roll pins and a multitude of similar parts. Will feed small parts for assembly requiring staking, press fitting, peening and riveting



Write for further information about these automated feeders and assembly machines.

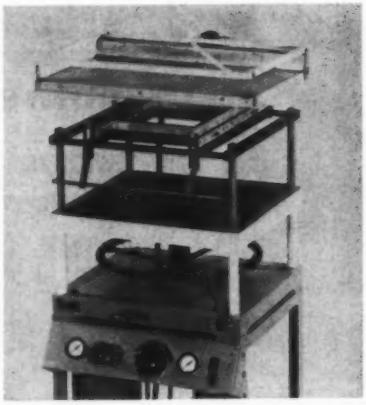
HABERSTUMP-HARRIS, INC.
10463 Northlawn Avenue • Detroit 4, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 953

Product News

Versatile Plastic Press

Three-dimensional forming operations in thermoplastic sheet material up to 18" square, using the principles of mechanical stretch forming, vacuum forming, and blow forming, are possible with a new plastic press. Get details of Model 18A from O'-Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn., or Circle Inform-A-Gram No. P39.



NEW PDQ
inteRapid
GROOVE CHECKING
Comparator Gauge
offers...

★ Precision, range and versatility
★ 3 and 2 point checking—3 point for production, 2 point for short runs
★ Quick setting adjustment knob sets scale reading from gage blocks, mikes or ring gauge.
★ Locking lever locks arms after setting is made
★ Retracting lever allows in and out movement of measuring arms while positioning instrument
★ Easily read large meter-type face is graduated in .0005".
★ Interchangeable tips offer versatility in application

The new P.D.Q. groove checking comparator gauge offers guaranteed Swiss accuracy and workmanship.

Sets come complete with both short and long groove tips, special "flat bottom" tips, button tips, centering arms, spare screws, special socket wrench and screw driver, all in one compact, sturdy case. Units measure internal grooves from 3/8" to 6"

Write for literature covering all the features of the new comparator gauge.

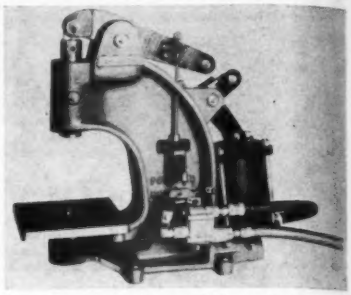
Representatives in principal cities

PDQ PORTAGE Double-Quick, Inc.
1046 SWEITZER AVENUE • AKRON 11, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 96

Bench Press-Riveter

Greater working power with less shock and increased accuracy in production is provided by this new bench press-riveter which combines



the toggle action of its triple-lever design with a special patent-pending action. Using only 100 psi shop air, it delivers 2 tons of driving force. Write Trio Machine & Mfg. Co., Willoughby, Ohio or Circle Inform-A-Gram No. P40.

Heavy Duty Drills

These new jobbers length drills handle super alloys and high strength steels. Made of hss with special point and short flutes, they work efficiently at high temperatures and are used either with stationary or portable drilling units. National Twist Drill & Tool Co., Rochester, Mich., or Circle Inform-A-Gram No. P41.

Easy Marking Tool

For marking jigs, tools, and fixtures and engraving parts numbers on aircraft and missile components, use this new marking tool that's operated by air. Air pen Model 116 adapts itself to any type of material by adjusting the speed of the blow. Thor Power Tool Co., 175 N. State St., Aurora, Ill., or Circle Inform-A-Gram No. P42.

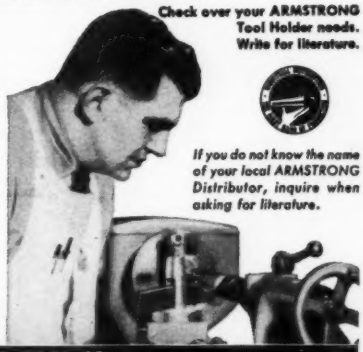
ARMSTRONG
TOOL HOLDERS

A Correct Tool for Every Lathe Operation

You can save time (and money) by ensuring that your machine tools are equipped with *adequate numbers* of the correct ARMSTRONG Tool Holders. The ARMSTRONG System of Tool Holders includes correctly designed tools for *every* standard operation on lathes, shapers, and planers, and for many operations on turret lathes and screw machines. By utilizing the ARMSTRONG System of Tool Holders, you can reduce tooling costs, eliminate down time in tooling up, operate your machine tools at maximum feeds and speeds.

ARMSTRONG Tool Holders are long-lasting tools. They are strong beyond need, handy and efficient, profitable to use, and are readily available from your local ARMSTRONG Distributor.

Check over your ARMSTRONG Tool Holder needs. Write for literature.



If you do not know the name of your local ARMSTRONG Distributor, inquire when asking for literature.

ARMSTRONG BROS. TOOL CO. 5330 W. ARMSTRONG AVE. CHICAGO 46, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 971

GET THIS NEW GRIPCO FASTENER MANUAL FREE!

This new technical bulletin gives all the engineering data and outstanding features of the Gripco line of locking fasteners, including Gripco Lock Nuts, Centerlock Nuts, Gripco and Centerlock Hi Nuts. Gripco and Centerlock Jam Nuts, Pilot-Projection Weld Nuts, Countersunk Weld Nuts, Clinch Nuts, the new Miniature Clinch and Weld Nuts, as well as Standard hexagon nuts in Steel or Brass. Full or Jam dimensions. Profusely illustrated, complete with application information on the self-locking features of the Gripco line, this manual should be in the hands of everyone who is faced with a fastener problem.

123

Send for yours today.

GRIP NUT COMPANY

107 Maple Street South Whitley, Indiana

CIRCLE INFORM-A-GRAM KEY NO. 972

NEW HOLOMATIC DRILL UNITS

with 4" – 6" or 10 INCH STROKE CAPACITY

To meet your ever increasing production tempo, Hause has developed two new drill units with 6" and 10" stroke capacities. As was the original time-proved 4" stroke model, the new Holomatic drill units are completely self-contained reciprocating quill type power devices for use on *production drilling, reaming, centering, facing,* etc. They can be used individually or in groups with manual or full automatic cycling. Units are air actuated, precisely controlled hydraulically. Available with six standard drives, motor horsepowers to 2 H. P., spindles are interchangeable for single or multiple head applications.

- **Concentric construction assures accuracy, longer life**
- **Honed, polished and chromed thrust piston and quill**
- **Up to 3600 four-inch stroke cycles per hour**
- **Automatically filled hydraulic system**
- **Built-in hydraulic oil filter system**
- **Sealed—oversize ball bearings on spindle and shaft**
- **Sealed unit construction *permits mounting in any position***
- **Mounting surfaces on three sides for installation flexibility**

Find out now—why Holomatic drill units are setting the pace in progressive production plants across the nation. Your Hause representative will gladly demonstrate their multiple dollar-saving efficiencies right in your plant.

Write today *... for demonstration or additional information, specifications and prices on the new Holomatic "Air-Hydraulic" Drill units, "Balanced Air" Threading units, "Lead Screw" Tapping units, complete machines or full line of machine bases and accessories.*

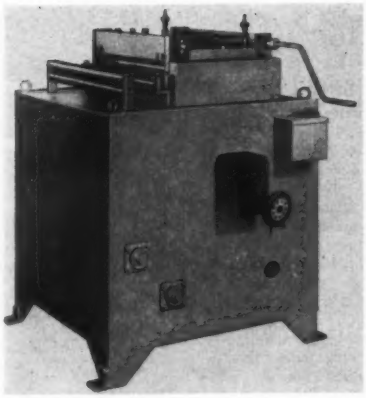
Hause MACHINES, INC. MONTPELIER, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 973

Product News

Feeder and Straightener

A new combination feeding and straightening machine feeds uniform, controlled lengths of coiled, flat, or strip stock, simultaneously passing them through a series of powered rolls, thus producing flat stock free of curl or camber. Timer can be set up to 60" stock feed. Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif., supplies a bulletin, or Circle No. P43.

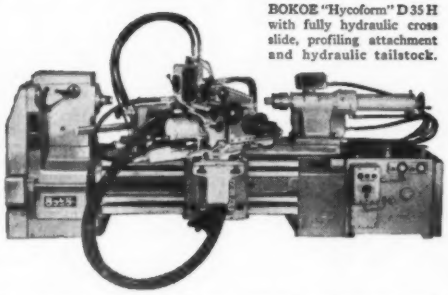


You can Adapt **BOKOE**

Flow Forming & Spinning Lathes To Your Exact Production Needs

From simple spinning lathes to fully hydraulic "Hycoform" machines with built-in copying attachment and automatic cycle control.

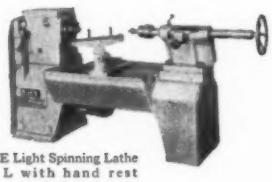
BOKOE adaptability can save you money—and simplify your spinning or flow forming production problems. BOKOE's "building block" design lets you choose a machine suited exactly to your production requirements. You don't have to "get by" with sub-capacity machines, or over-invest in more machine than you need. And you can extend the production performance of your BOKOE machine whenever necessary.



BOKOE "Hycoform" D 35 H with fully hydraulic cross slide, profiling attachment and hydraulic tailstock.

From basic design with hand rest and mechanical tailstock, BOKOE machines can be extended to include:

- Mechanical, hydro-mechanical or fully hydraulic cross-slide
- Front only or combined front & rear cross-slides
- Mechanical or fully hydraulic tailstock
- Built-in, hydraulic copying attachment
- Automatic cycle control



BOKOE Light Spinning Lathe D 35 L with hand rest and mechanical tailstock.

There's a BOKOE machine for every type of spinning and flow forming operation—for light and heavy work on ferrous and non-ferrous materials—for cylindrical and conical shapes and nose cones used in aircraft and missile applications.

- Flow forming of Aluminum up to ⅝" thickness
- Flow forming of soft steel up to ¼" thickness
- Swing up to 86" maximum
- Longitudinal slide movement of 40"

Write For Information

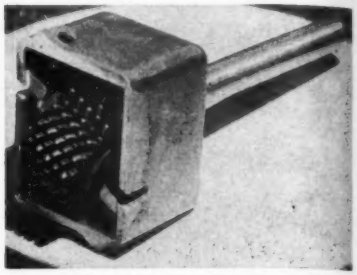
COSA *Importers of Leading Precision Machine Tools Nationwide Sales and Service*
COSA CORPORATION, 405 LEXINGTON AVENUE, NEW YORK 17, N.Y.

IN CANADA contact COSA CORP. OF CANADA, LTD., 1160 Lakeshore Rd., Long Branch, Toronto 14, Ont.

CIRCLE INFORM-A-GRAM KEY NO. 98

Tangential Angle Dresser

This heavy-duty low-cost wheel dresser is 6" long with 3/4" dia shank and is made of high tensile strength cast aluminum alloy. The built-in tangential angle of the cutters eliminates need for breaking device and assures sharp, cool grinding. Get details of Model 10 from L. Newman, 1001 24th St., Oakland 7, Calif., or Circle No. P44.

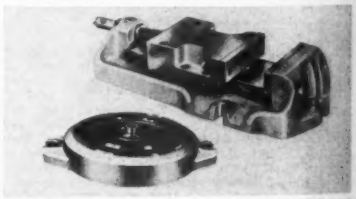


Master Coil Sets

Save time when changing and adjusting work coil assemblies for induction heating with the new Master coil set. Sets are available for all electronic generators and come in two sizes. Get details from Induction Heating Corp., Dept. PR-6, 181 Wythe Ave., Brooklyn 11, N.Y., or Circle Inform-A-Gram No. P45.

Trough Vises

Longer service with lower maintenance and over-all cost are features made possible using ductile iron trough vises. Large troughs guide the coolant to return without slopping over. Available in jaw capacities of 4" to 8". The Skinner Chuck Co., Dept. D10, 105 Edgewood Ave., New Britain, Conn., or Circle Inform-A-Gram No. P46.



You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

IN 11 SIZES No. 6 to 1" N.C. In all S. A. E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench —no other tools needed. Get more work now—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 991

The Inform-A-Gram card which follows page 66 is for your convenience in making inquiries about advertised Products and Editorial items.

JUST OUT! NEW 1959 EDITION

free 84-PAGE CATALOG

One Complete Source of Detailed Specifications for Designers, Production Managers, Toolroom Foremen

Hundreds of NEW ITEMS

ALL NEW — Complete specifications and cost saving data on over 2000 "Standards", including world's largest line of work-holding equipment, chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, plus hundreds of other jig and fixture components. Detailed specifications, engineering drawings. The one complete source for data on all the "standards" for tool, die, jig, and fixture design and application.

Write for your FREE copy today.

JERGENS TOOL SPECIALTY CO.

Dept. TP-12, 712 E. 163rd St., Cleveland 10, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 993

low cost HYDRAULIC KEYSEATER

cuts standard, tapered keyways ¼" to 2" wide

- fast set-up—saves time and money
- low cost operation-uses standard tool bits
- heavy-duty hydraulic circuit—assures accurate keyways
- compact, 21" x 61"—no special foundation

Send for Bulletin 34

E. W. BLISS COMPANY

CANTON, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 995

Mold your own LEAD HAMMERS

Here's the inexpensive, fast way of molding and remolding your own lead hammers with this COOK mold and ladle. It produces hammers that can "take it" Simple to operate.

Write for circular and prices

COOK'S LEAD HAMMER SERVICE

68 Massasoit Avenue, East Providence 14, R.I.

CIRCLE INFORM-A-GRAM KEY NO. 992

NOW...Better by actual test...

this NEW A.I.T. "E-2" Diamond Wheel for...

ELECTROLYTIC GRINDING

The exclusive "E-2" bond in A.I.T. diamond wheels has been developed specifically to guarantee that you get the FULL VALUE out of Electrolytic grinding of carbides. We can prove this in YOUR plant, on YOUR grinders, with these results:

1. **Wheel pre-run to eliminate break-in time in YOUR plant.**
2. **Faster stock removal.**
3. **High peak removal for longer intervals**
4. **Longer wheel life.**
5. **Less corrosive action**
6. **Specially designed wheel to reduce weight and distribute electrolyte efficiently**

Remember, to get these FULL VALUE results, be sure to send for complete test data today.

A.I.T. Diamond Tool Co.

8217 N. KIMBALL AVE.
SKOKIE, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 994

SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand — sizes 3/32" to ½" by 1/64" plus handy 17/32" size—length 4⅞". PRICE only $17.90

Single sizes available.

R. L. SPELLMAN CO. • Urbana, Ohio

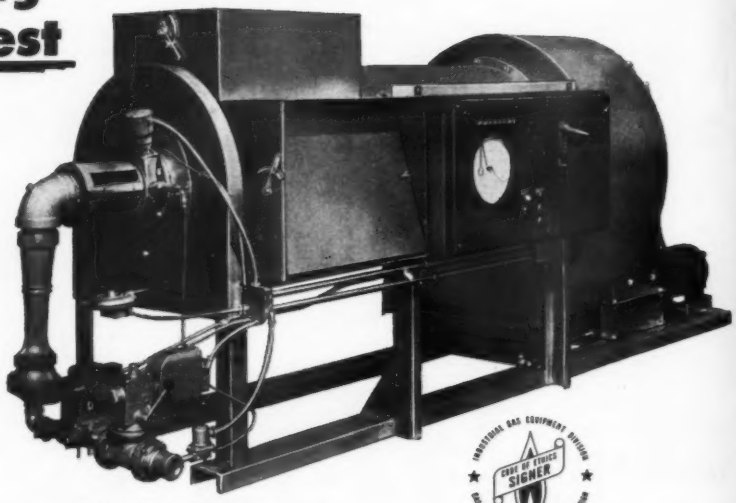
CIRCLE INFORM-A-GRAM KEY NO. 996

Heat Processing at its best

with NEW G. A. S. UTILITY AIR HEATER

A complete package unit, modern as tomorrow in both design and performance, this new direct gas-fired line of industrial heaters comes to you complete with control cabinet, temperature and safety instruments, fan and motor, wired for immediate operation. Can be furnished for remote control wiring. Capacities range from 125,000 BTU's/hr., to 4,000,000 BTU's/hr.,—temperatures to 600°F. in standard models and to 1,000°F., in famous G.A.S. Rapidry Models. Features injector type atmospheric type burners (combination gas-oil burners when desired), heavy-duty industrial type blower, and electrical ignition. Exceptionally quiet operation.

Request complete information.



Model 409H illustrated.
Capacity 2,000,000 BTU's/hr.
Complete with controls.

GAS APPLIANCE SERVICE, INC.
Heat Process Engineers
1936 West Balmoral Ave., • Chicago 40, Ill.
Representatives in Major Industrial Areas

CIRCLE INFORM-A-GRAM KEY NO. 1001

BURR-BIT CUTS TAPPING COST WAY DOWN!

Just lock Burr-Bit on any make tap and holes are deburred automatically, leaving a smooth clean chamfer. *ONE operation, ONE setup, ONE handling.*

NEW ADDITION
Now Burr-Bit fits 3 fluted taps from #6 to ½". Also available to fit any tap 2 or 4 fluted from #2 to ¾", as well as heli-coil.

A quality product made of the finest high speed tool steel for use on almost every material. WRITE now for complete data and reports from engineers who have adapted Burr-Bit and saved on *their* tapping operations.

INVESTIGATE Burr-Bit today.

VERNON DEVICES, Inc.
481 E. 3rd Street Mt. Vernon, N.Y. MOunt Vernon 4-1686

CIRCLE INFORM-A-GRAM KEY NO. 1002

GAGE COMPANY Deep-Etch
PRECISION PLASTIC • NON-BREAKABLE
COMPARATOR SCALES

Highly accurate and designed for making quick measurements at scale on projectors and comparators without any movement of machine or work.

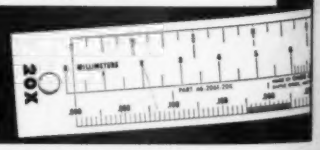
Supplied on Gage Company Precision Plastic . . . a sturdy, non-breakable material of constant stability, .125 in thickness.

Unexcelled as a tool for use in drafting and engineering scale layouts for use on comparators.

Available in all standard magnifications and in several lengths. Various styles for all applications.

WRITE FOR BULLETIN NO. 58-70

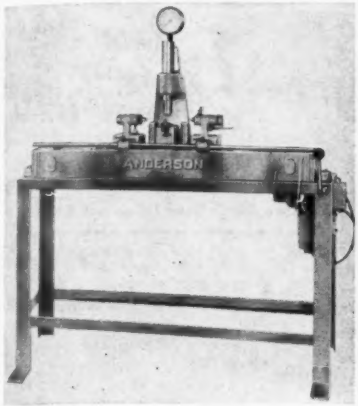
GAGE COMPANY
• • • BOX 1080
Battle Creek, Michigan



CIRCLE INFORM-A-GRAM KEY NO. 1003

Small Straightening Press

A new 4-ton power-actuated hydraulic straightening press, Model HP004P, has been added to the line which employs the basic features of the 10, 25, and 50 ton models. Anderson Bros. Mfg. Co., 1907 Kishawakee, Rockford, Ill., or Circle Inform-A-Gram No. P47.



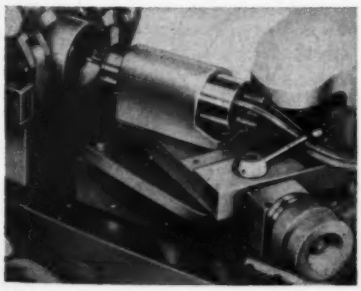
Simplified Scheduling

For scheduling orders and production use the Rol-a-chart, a visual control board. Entries are made on the rotating plastic sleeve and can

be wiped off. Conley, Baltzer & Steward, Rol-a-Chart Div'n, 494 Jefferson St., San Francisco 9, or Circle Inform-A-Gram No. P48.

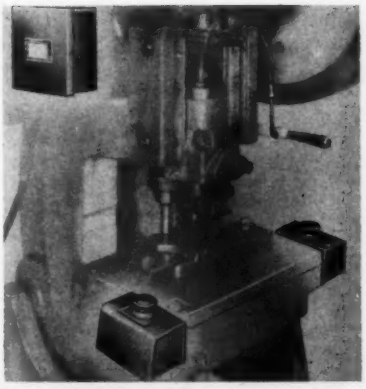
Small Parts Grinder

For economic and accurate interior and exterior grinding of small parts, use the Overbeck grinding machines which feature hardened guide ways and spindle bearings, which are fast sliding even though they're clamped tightly. For information, write Aaron Machinery Co., Inc., 45 Crosby St., New York 12, or Circle Inform-A-Gram No. P49.



Two-Hand Press Control

To keep both hands of the operator safely away from the stroke of the power press ram, use the Ambi - Trip two - hand pushbutton press control. The self-contained system energizes the solenoid of a press-clutch only if both pushbuttons are simultaneously pressed. Durant Tool Co., 12 Thurbers Ave., Providence 5, R. I., or Circle Inform-A-Gram No. P50.



MOLINE

FOR GREATER PRODUCTION EFFICIENCY SAVINGS

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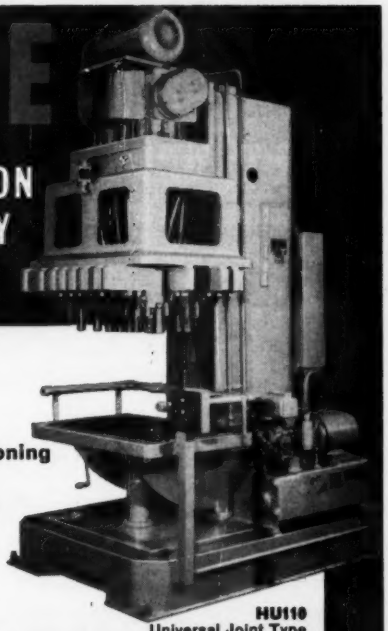

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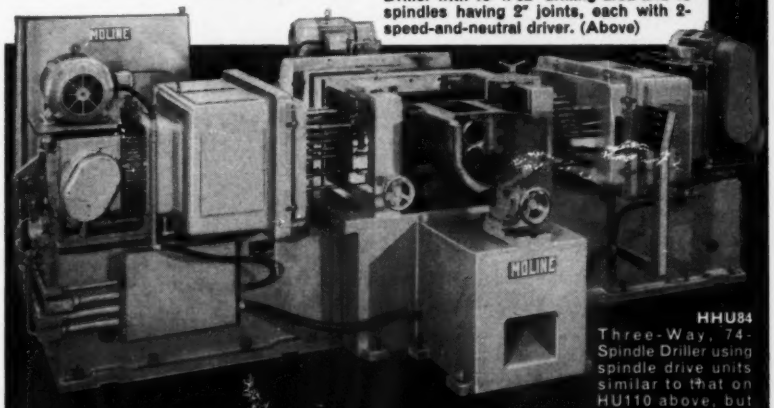

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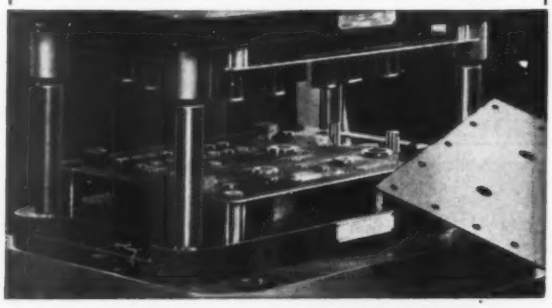

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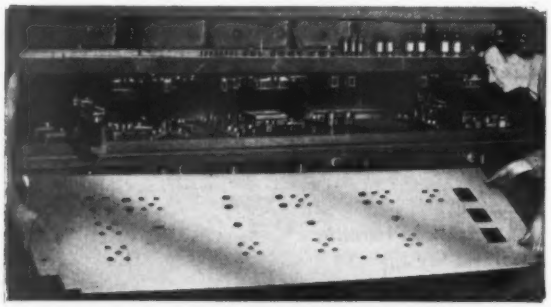

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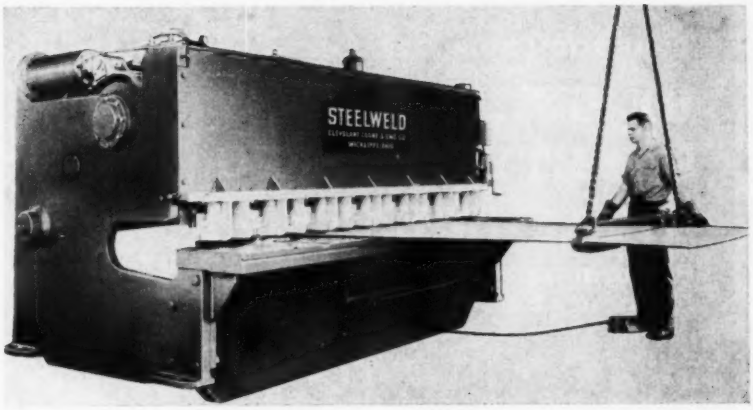

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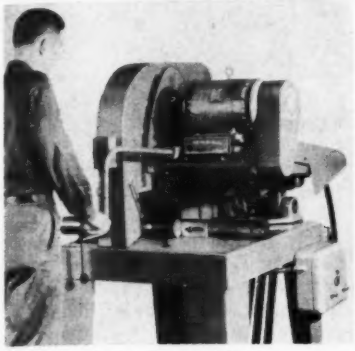

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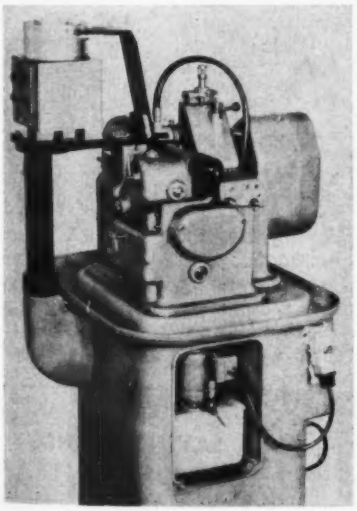

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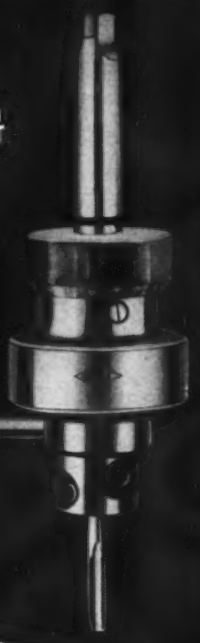

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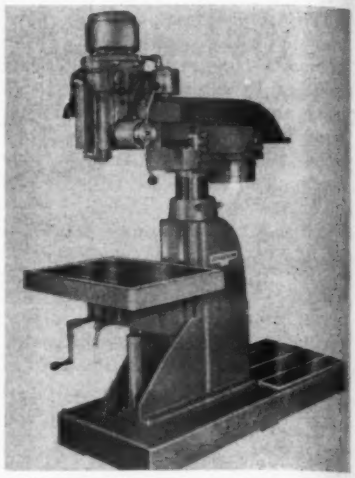

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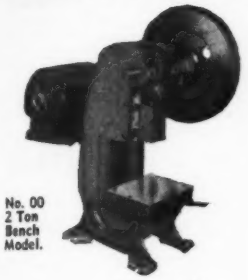

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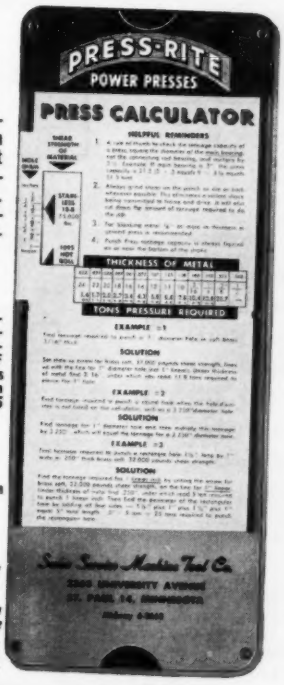

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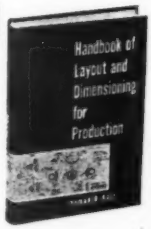

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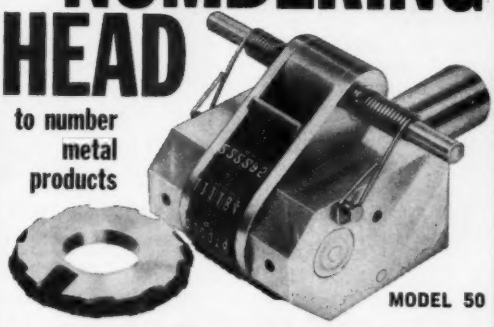

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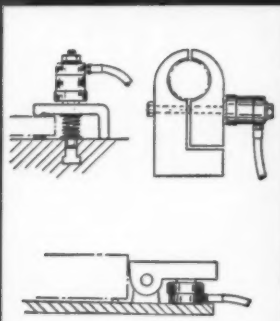

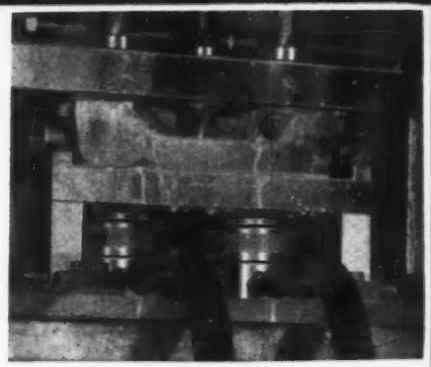

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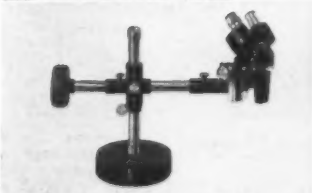

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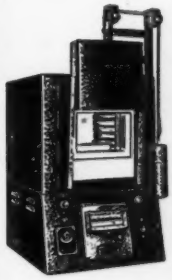

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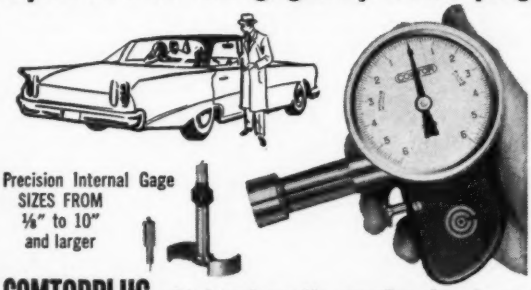

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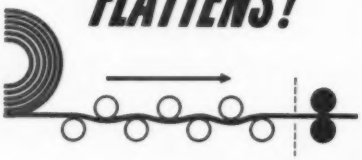

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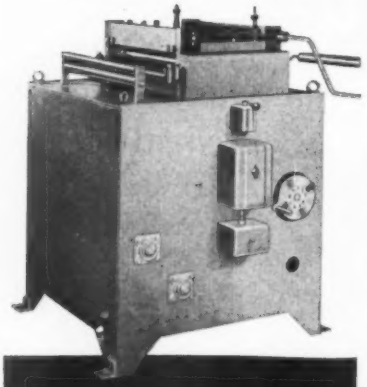

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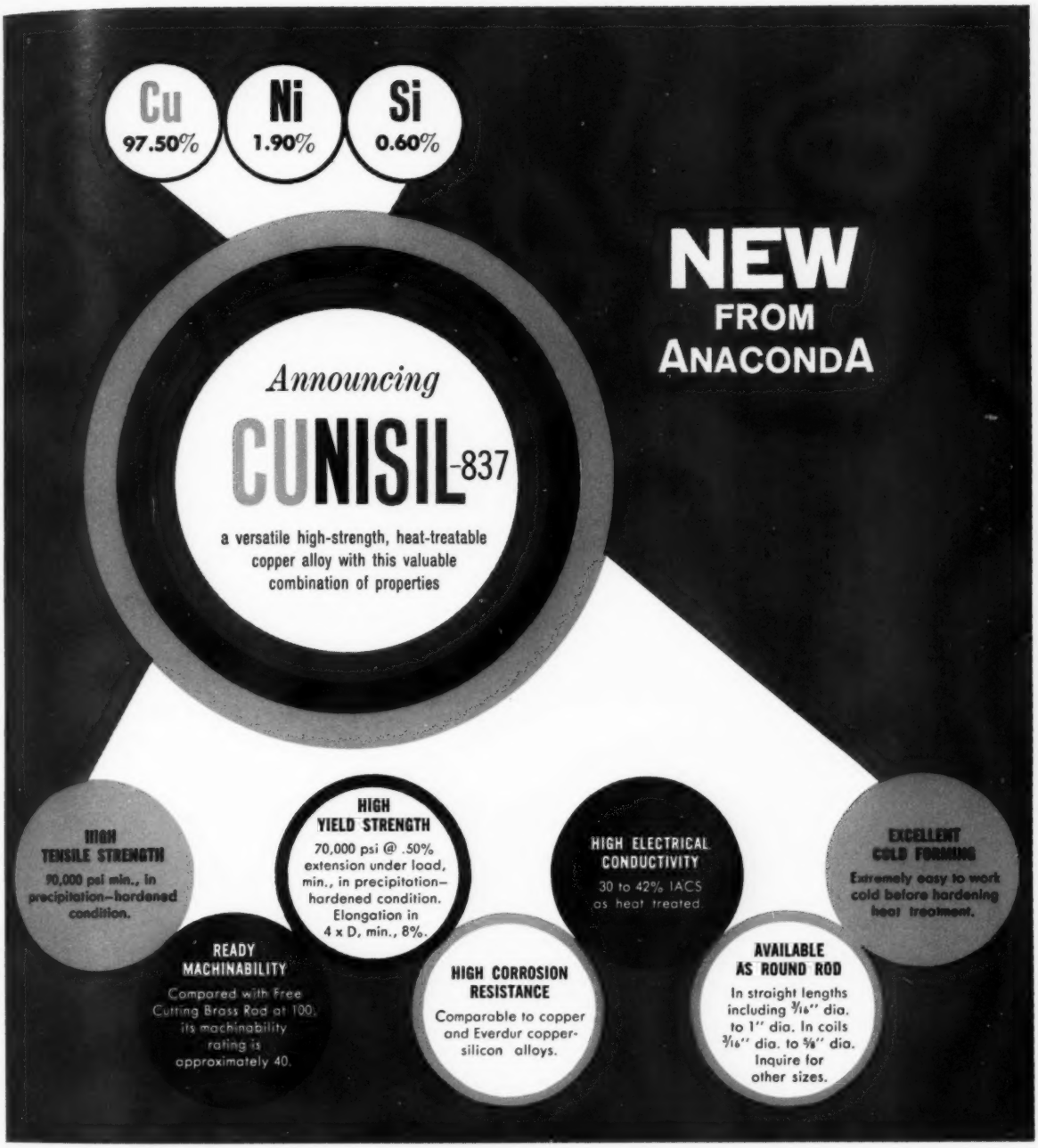
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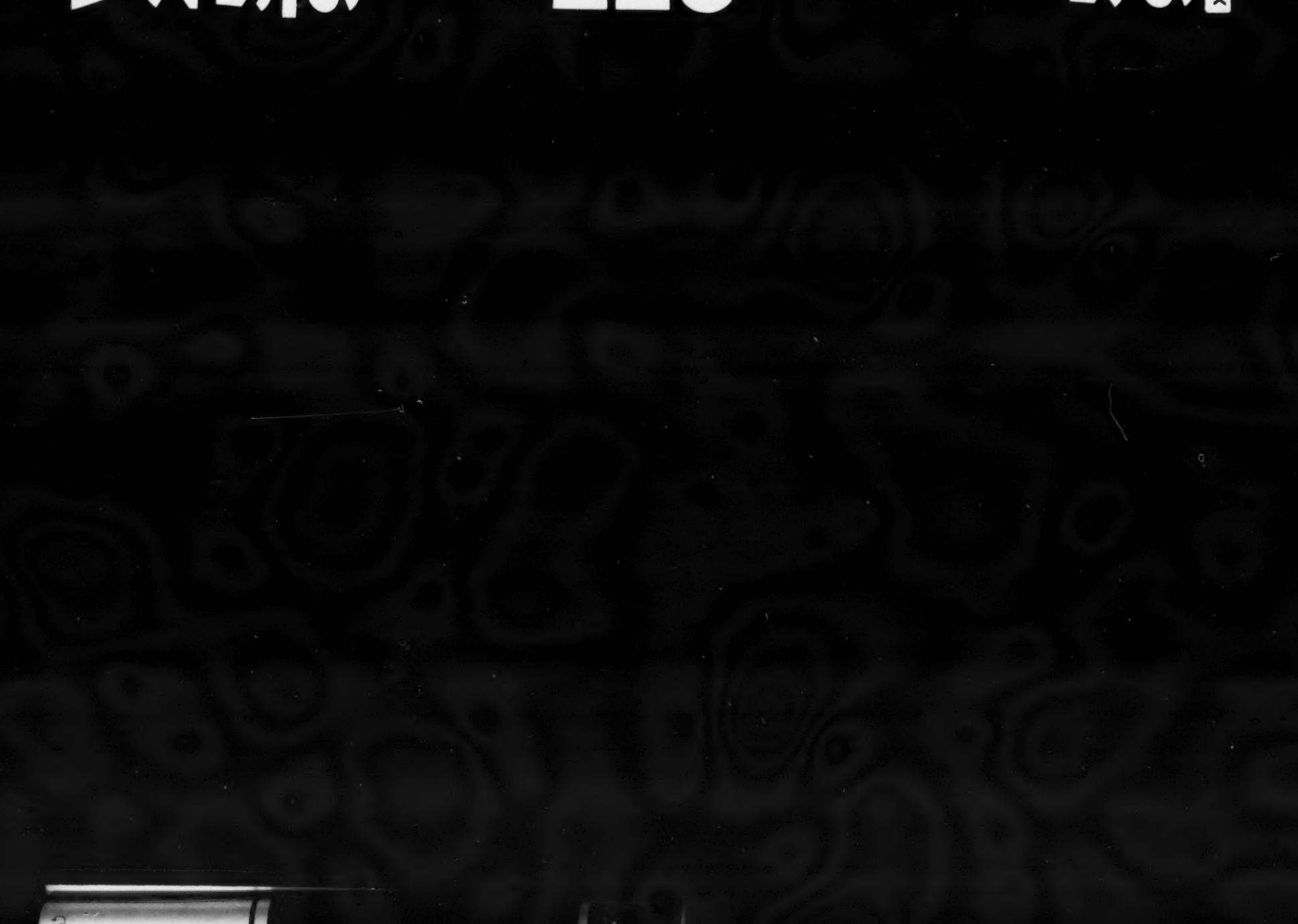
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